

nanoscience and nanotechnology: small is different

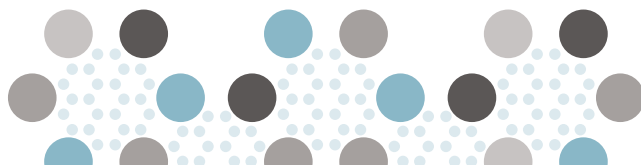


 **institute**  
**imdea**  EXCELENCIA  
SEVERO  
OCHOA  
**nanoscience**

nano

20

annual  
report



An abstract graphic design featuring a dark blue background with various light blue and white elements. There are several overlapping circular patterns, some resembling ripples or concentric circles, and others that look like clusters of small dots. A horizontal dotted line runs across the middle of the page, starting from the left edge and extending towards the right. The overall aesthetic is clean and modern, with a focus on geometric and organic shapes.

foreword

nano  
**20**  
annual  
report



A handwritten signature in black 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 2021

2020 has been a very difficult year. The pandemic has deeply affected our lives, the way we work, our worries and, in too many cases, directly, our health. IMDEA Nanociencia has not been an exception. We have faced a most difficult time. And, in spite of all, I can proudly state that we have been extremely successful. Thanks to the dedication, commitment and strength of our personnel, we have navigated the waves of the pandemic almost unaffected. The building has been open almost all the time. Scientific and administrative activities have continued among strict measures and a careful organization to limit risks and detect potential problems. The flexibility of the structure of the Institute has been reflected in our rapid reaction to move part of our research to address COVID19 related issues, with the development of a strong interdisciplinary effort in developing a fast, sensitive and simple test for the virus.

The summarized result of the activities of the Institute in 2020 is reflected in this booklet.

The almost 200 researchers of our Institute have published more than 230 papers in 2020, reaching a total amount of more than 2200 (with 75% of them in Q1 and 37% in D1 journals). The ac-

cumulated number of citations of the papers produced by IMDEA Nanociencia researchers has risen to more than 64000 by the end of the year. The institutional h index was 108. All of this has placed IMDEA Nanociencia among the highest-ranked organizations in Spain in the prestigious Nature Index.

It is truly remarkable that in this complicated year, new facilities have been installed and new labs are now operational: a new spin polarized ARPES system, unique in Spain, new labs for chemical synthesis, cell cultures and optical spectroscopy, a renewed liquefier plant to produce liquid Helium from the recovered gas, a new STEM microscope, a new X-ray diffractometer, and new STMs which can go down to temperatures of 800 mK with 3 Teslas applied magnetic field or perform non-contact AFM in UHV.

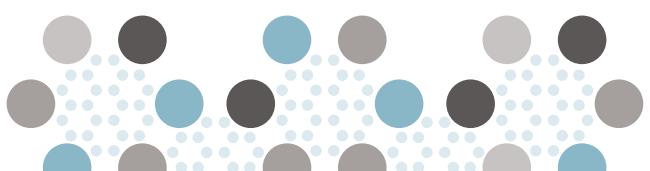
Preparing ourselves for a future Severo Ochoa Programme has required a reorganization of our research lines and the creation of new ones, as well as changes in the internal governance structure, which is reflected in the Executive Commission, composed of three Deputy Directors (Scientific Strategy, Dr. 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 2020 the amazing figure of 2/3 of our budget being obtained from external, competitive sources, with only 1/3 coming directly from the administration. We have to remember that in 2009 the fraction of competitive funds that we were able to obtain was only 1/3 of the total. Even in the unusual circumstances of this year we have been able to obtain numerous projects from many different sources (private companies, European and American sources) in areas going from health or disruptive nanomaterials to ultrafast phenomena or quantum technologies. In spite of this success, there is a clear 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 has shown a clear commitment in this direction.

During this year, hard and painful, 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 honor for me to be still part of this adventure.



nano  
**20**  
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.

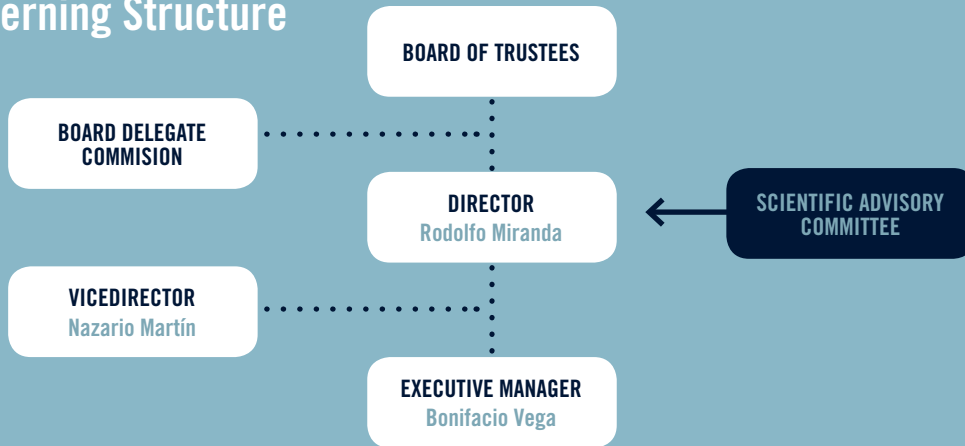
In spite of this, a new step forward is needed for the future international competitiveness of R+D in Nanoscience and Nanotechnology. A suitable organizational and working environment needs to be created with the aim to promote the continuous interdisciplinary interaction between specialists in physics, 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







## Research Programmes Committee



**Prof. Rodolfo Miranda**



**Prof. Francisco Guinea**



**Prof. J.L. Carrascosa**



**Prof. José Luis Vicent**



**Prof. Julio Camarero**



**Prof. Isabel Rodríguez**



**Prof. Daniel Granados**



**Prof. Nazario Martín**



**Prof. J. Gierschner**



**Prof. Alberto Bollero**



**Prof. Cristina Flors**



**Prof. Emilio Pérez**

## Management Committee

**Executive Manager**  
**Bonifacio Vega**

**Projects & HR**  
**Maria Jesús Villa**

**MANAGEMENT**  
**COMITEE**

**Administration & Finances**  
**Isabel Rodríguez**

**Facilities & Infrastructures**  
**Jose Luis Casillas**

## 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.

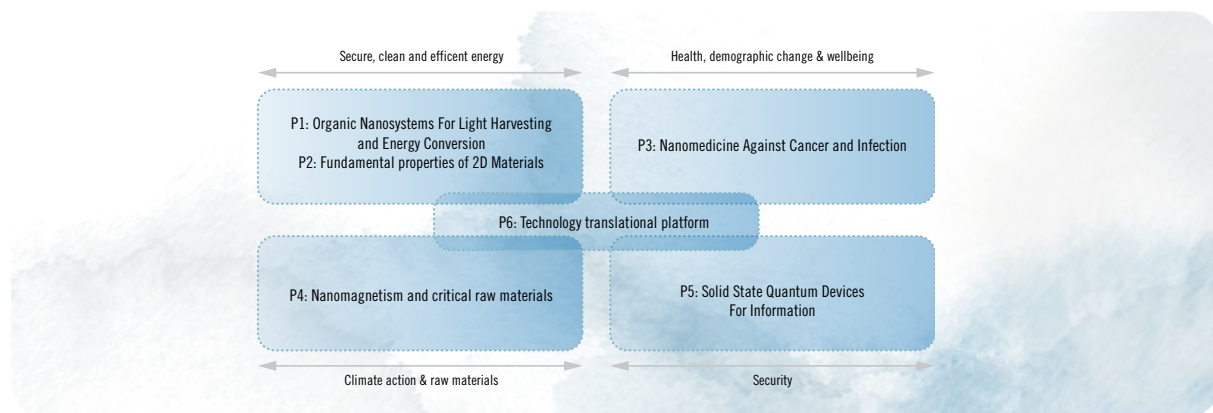
The funding provided by the Severo Ochoa award supports the strengthening of the existing interdisciplinary character of the centre and combines different types of expertise to find innovative solutions for social and economic challenges.

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. Eduardo Sicilia Cavanillas**

Counselor of Science, Universities and Innovation, Madrid Regional Government, Spain

**Ms. Sara Gomez Martin (until June 2020)**

**Ms. Irene Delgado Sotillos (since June 2020)**

General Director of Universities and Higher Artistic Teachings, Madrid Regional Government, Spain

**Ms. M<sup>a</sup> Luisa Castaño Marín**

General Director of Research and Innovation, Madrid Regional Government, Spain

**Ms. Bárbara Fernández-Revuelta Fernández-Durán**

Deputy Director General for Research, Madrid Regional Government, Spain

**Mr. José de la Sota Rius**

Deputy Director of the Madrimasd Foundation

### 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. Carlos Andrés Prieto de Castro**

Spanish National Research Council (CSIC), Spain

**Prof. Ignacio Lizasoain Hernández**

Complutense University of Madrid. Spain

**Prof. José Manuel González Sancho**

Autónoma University of Madrid. Spain

**Prof. Fernando Calle**

Polytechnic University of Madrid. Spain

### INDUSTRY

**Mr. Emilio Ramiro Arcas**

(substitute: Mrs. Silvia Cristina López Vidal)  
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**

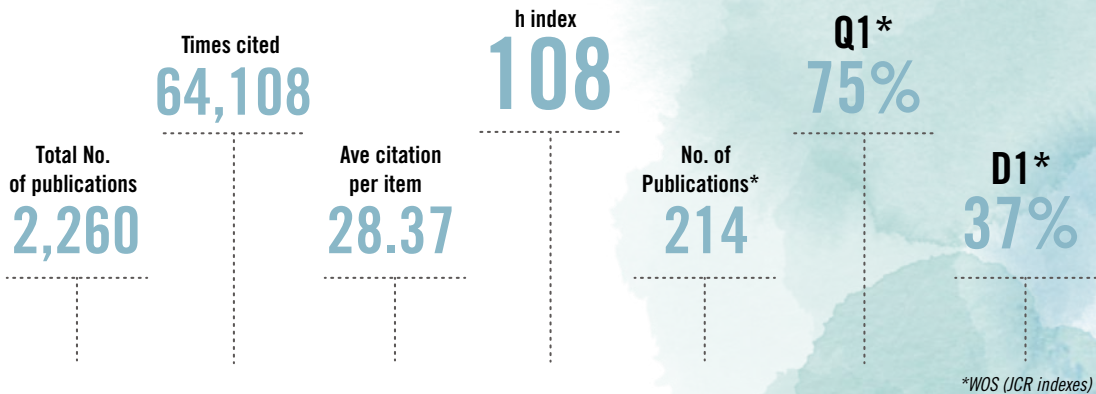
Department of Physics, University of Basel. Switzerland

**Prof. Yvan Bruynserade**

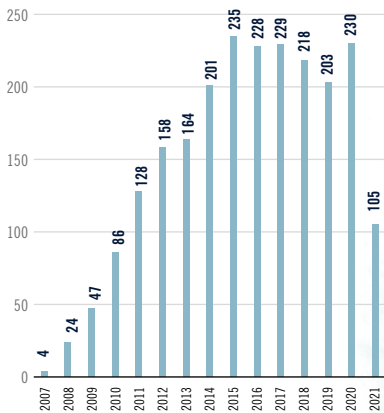
Department of Physics and Astronomy, Katholieke Universiteit Leuven, Belgium

## 7. IMDEA Nanociencia at a Glance

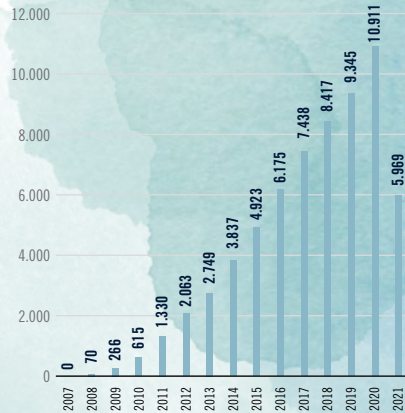
### Scientific Production



### Publications in each year



### Citations in each year



### Highly cited researchers

#### Prof F Guinea named as one of 2020'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.

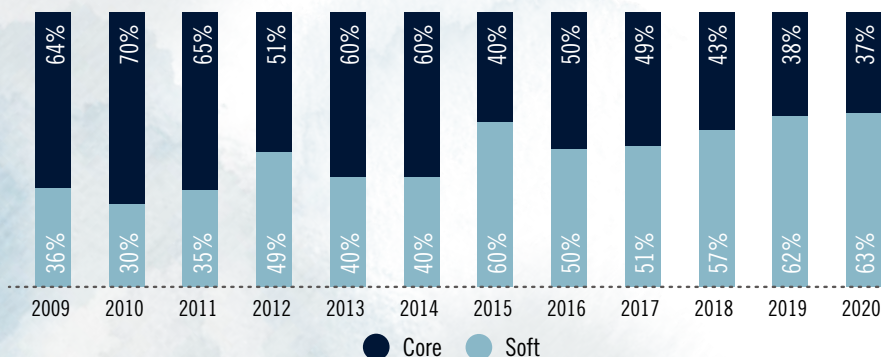


### Talent



### 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

IMDEA Nanoscience Institute  
Spain



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

INSTITUTION	COUNT	SHARE
Spanish National Research Council (CSIC)	1207	209.41
Institute of Health Carlos III (ISCIII)	264	22.37
<b>IMDEA Nanociencia</b>	<b>52</b>	<b>7.76</b>
Spanish National Center for Cardiovascular Research (CNIC)	24	7.02
Basque Center for Macromolecular Design and Engineering	30	6.31
ALBA Synchrotron	45	5.96
Basque Research and Technology Alliance (BRTA)	31	5.18
Centre for Energy, Environment and Technology (CIEMAT)	86	4.24
National Institute for Agricultural and Food Research and Technology	15	2.48
Catalan Institute for Water Research (ICRA)	8	1.66

# 2

## research programmes and scientists



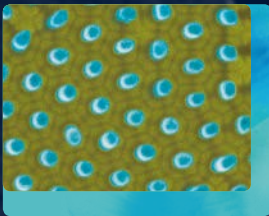
Nanochemistry  
[16]



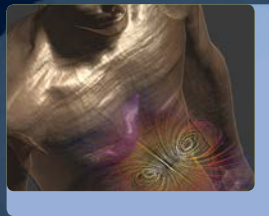
Time Resolved  
Spectroscopies  
[28]



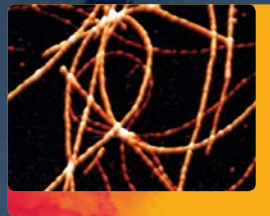
Atomic Scale  
Quantum Materials  
[38]



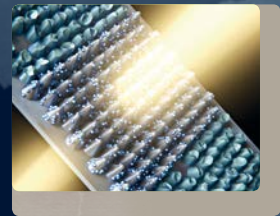
**NanoMagnetism**  
[50]



**Nanomedicine**  
[60]



**Nanobiosystems**  
[70]



**Nanofabrication**  
[78]

programme

# Nanochemistry

Programme Manager: Prof. Nazario Martín

## Research lines

**Nanocarbons and Organic Photovoltaics**

Prof. Nazario Martín

**Catalysis and Systems Chemistry**

Dr. Ignacio Colomer

**Covalent Organic Frameworks**

Prof. Félix Zamora

**Chemistry of Low-Dimensional Materials**

Prof. Emilio M. Pérez

**Electrochemical Biosensors**

Prof. Encarnación Lorenzo

**Biosensors**

Prof. José Manuel Pingarrón

**Switchable Nanomaterials**

Dr. José Sánchez Costa

**Functional Organic Materials**

Prof. Tomás Torres

**Functional Organic Materials Hybrid Nanomaterials**

Dr. Beatriz H. Juárez

**Functional Nanoscale Materials and Devices**

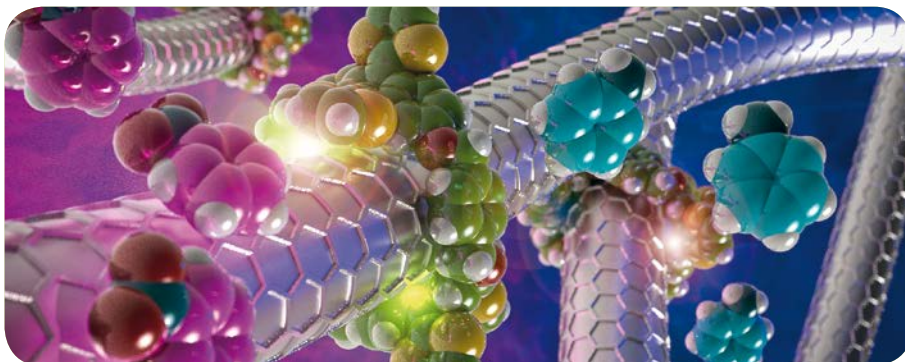
Dr. Enrique Burzuri





## About the programme

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 at the time scale of femtoseconds (both theoretically and experimentally at IMDEA) and the exploration of the time scale of the few femtoseconds into the attosecond (at least theoretically). The properties of prototype solar cells at very long time scales (ms) will be also explored experimentally. The practical objective is the use of this information, if possible, for the corresponding optimization of functional organic devices, such as organic solar cells, as well as the preparation of a variety of materials for hole and electron transport, respectively, in perovskite- based solar cells.



# Nanocarbons and Organic Photovoltaics

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

## GROUP LEADER

### Prof. Nazario Martín

Research Professor

PhD: Universidad Complutense de Madrid, Spain

Double Affiliation: Universidad Complutense de Madrid, Spain

#### ORCID:

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#### Researcher ID:

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## POSTDOCS

### Dr. Agustín Molina Ontoria

University of Texas at El Paso, USA

### Dr. José Santos

Durham University, UK

### Dr. Inés García Benito

Ecole polytechnique fédérale de Lausanne, Swiss

### Dr. Javier Urieta

Universidad Complutense de Madrid, Spain

## PHD STUDENTS

Eider Sánchez

Jesus Galán

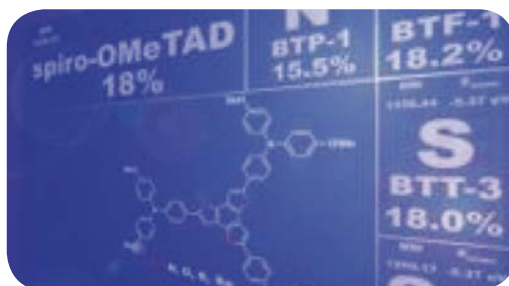
Luis Manuel Mateo

## 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 C<sub>3</sub> 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>

## GROUP LEADER

### Prof. Emilio M. Pérez

Senior Research Prof.

PhD: University of Edinburgh, UK

Previous Position: Universidad Complutense de Madrid, Spain

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#### Researcher ID:

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## POSTDOCS

### Dr. Manuel Vázquez

University of Trieste, Italy

### Dr. Xu Wei

The Hong Kong Polytechnic University, Hong Kong

### Dr. Zhang Wanzheng

University of Erlangen-Nürnberg, German

### Dr. Matthew Eaton

Northern University, Illinois, USA

### Dr. Natalia Martín Sabanes

Johannes Gutenberg University, Mainz, Germany

### Dr. Julia Villalva

Universidad Autónoma de Madrid, Spain

## PhD STUDENTS

Sara Moreno

Alicia Naranjo

Tomás Nicolás

Ramiro Quirós

Julia Villalva

## TECHNICIANS

Christine Marie Arenas

Silvia Miranda

## VISITOR

### Dr. Eric Anglaret

University of Montpellier, France

## 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>

### GROUP LEADER

**Dr. José Sánchez Costa**  
Assistant Research Prof.  
(tenure track)

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

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

### ORCID:

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### Research ID:

N-9085-2014



### POSTDOCS

**Dr. Arturo Gamonal**  
Federal University of  
Pernambuco, Brasil

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

### PHD STUDENTS

**Estefanía Fernandez**

**Esther Resines**

**Ana Martínez Martínez**

### MSC

**Jorge Sangrador**  
Universidad Autónoma  
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**Elena Laso**  
Universidad Autónoma  
de Madrid, Spain

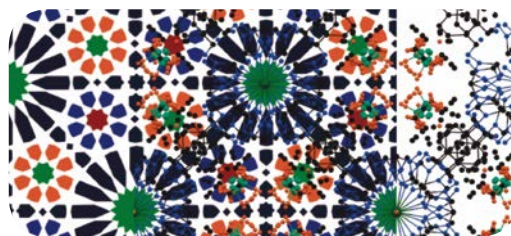
**Aida García**  
Universidad Autónoma  
de Madrid, Spain

## Research lines

At the Switchable NanoMaterials group (SNM) we are mainly focused on the development of metal-based coordination complexes at the macro- and nanoscopic scale for their technological application in the fields of quantum computing, spintronic and sensing devices. Besides, we are interested in developing novel dynamic molecules sticker by soft interactions capable 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 (Dalton Transactions, 2020, 49, 7315; Chemistry-A European Journal, 2020, 26, 10801)
2. Functional Metal-Organic Frameworks, MOFs. (JPCL, 2020, 11, 9, 3362-3368, Chem. Comm. 2019, 54, 5526)
3. Non-porous architectures acting as porous compounds (ICF, 2020, 7, 3165-3175; ACIE, 2019, 58, 2310; Chemical Science, 2019, 10, 6612)

A novel extended triazole-based ligand (PM-Tria) has been synthesized and an unprecedented MOF 3D architecture has serendipitously been formed by assembling iron(II), PM-tria ligand and fluoride anions. This MOF contains a perfectly linear one-dimensional  $[\text{Fe}(\text{II})-\text{F}]_n$  bridging chain that shows an antiferromagnetic behaviour. Furthermore, the structure is compared with a 14<sup>th</sup> century mosaic found in the Alhambra Palace in Granada showing a surprising symmetry resemblance See *Chem. Commun.*, **2018**, 54, 5526.





# Functional Nanoscale Materials and Devices

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

## GROUP LEADER

### Dr. Enrique Burzurí

Position: Assistant Research  
Prof. (tenure track)

PhD: Universidad de Zaragoza

Previous Position: TU Delft, The  
Netherlands.

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#### Researcher ID:

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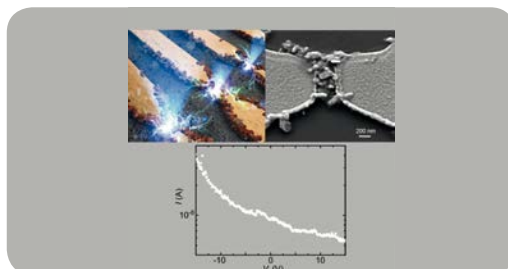
## PHD STUDENTS

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 frangeite 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.



## Catalysis and systems chemistry

Webpage: <https://colomerlab.com>

### GROUP LEADER

#### Dr. Ignacio Colomer

Assistant Research Prof.  
(tenure track)

PhD: Universidad Complutense de Madrid, Spain

Previous Position: University of Oxford, UK

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AAB-2389-2020

#### Scopus:

38562666400



### POSTDOCS

#### Dr. Laura Trulli

University of Rome  
"La Sapienza"

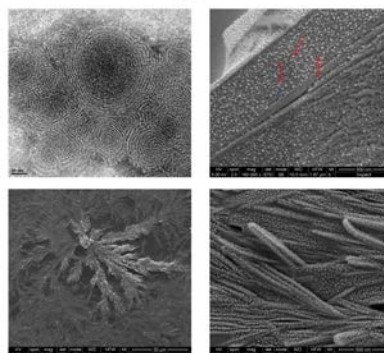
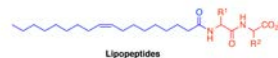
### PhD STUDENTS

#### César Vicente

## Research lines

Our group has focused on three main research lines:

1. The long-term goal of **building a synthetic protocell** based on chemical reactivity principles. This challenging bottom-up project intends to generate a toolbox of chemical reactions that can be used to build increasingly complex dynamic systems that operate far-from-equilibrium.
2. We are particularly interested in **designing and using small lipopeptides**, studying their supramolecular behaviour to understand their properties and apply them in different areas, such as catalysis, antibacterial, drug delivery or as privileged scaffolds in systems chemistry.
3. The use of **Hexafluoroisopropanol (HFIP)** as a **privileged solvent** (*Nat. Rev. Chem.* **2017**, 1, 0088) in the selective synthesis and functionalization of organic molecules with medical and biological interest (*ACS Catal.* **2020**, 10, 6023), with interesting applications in the fields of chemical biology and polymer science.





# Electrochemical Nanobiosensors

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

## GROUP LEADER

### Prof. María Encarnación Lorenzo Abad

Associate Research Professor

PhD: Universidad Autónoma de Madrid, Spain

Double Affiliation: Universidad 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 metallocarboranes 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 nanomaterials for the fabrication of energy storage devices. For example, graphene decorated SiC nanomaterial (graphene@SiC) (fabricated via an adiabatic process), has been physicochemically 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 electrochemistry) for the mechanistic elucidation of electrochemically driven structural transformation or nanomaterial chemical modification.**

## Functional Organic Materials

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

### GROUP LEADER

#### Prof. Tomás Torres Cebada

Associate Senior Scientist

PhD: Universidad Autónoma de Madrid, Spain

Double Affiliation: Universidad Autónoma de Madrid, Spain

#### ORCID:

0000-0001-9335-6935

#### Research ID:

H-9796-2014



### ASSOCIATE SCIENTIST

#### 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

### POSTDOC

#### Dr. Maxence Urbani

University of Toulouse, France

### PhD STUDENT

#### Álvaro Corrochano

#### Luis M. Mateo

#### Miguel Martínez

## Research lines

Our research focuses on the preparation and study of molecular materials based on porphyrinoids like, phthalocyanines (Pcs), subphthalocyanines (SubPcs), and porphyrins (Pors), among others.

1. One research line deals with the use of Pcs as active components in solar cells. We have made significant progresses in the use of Pcs as photosensitizers in inverted dye sensitized solar cells (*Angew. Chem. Int. Ed.*, **2019**, 58, 4056), in non-fullerene acceptors (*Angew. Chem. Int. Ed.* **2019**, 58, 14644, *J. Am. Chem. Soc.* **2020**, 142, 7920) and in light-harvesting subporphyrazines (SubPzs) for intramolecular singlet fission (*Angew. Chem. Int. Ed.* **2021**, 60, 1474). We have also reviewed the use of Pcs as hole-transporting materials in perovskite-sensitized solar cells (*Chem. Soc. Rev.*, **2019**, 48, 2738).
2. Our group is also active in the area of photodynamic therapy (PDT), and have reviewed recently on the unique features of Pcs as advanced photosensitizers for PDT of cancer (*Chem. Soc. Rev.* **2020**, 49, 1041). We have also successfully used Pcs in antimicrobial PDT (*Eur. J. Med. Chem.* **2020**, 187, 111957).
3. Finally, our group is investigating the use of porphyrinoids in nanotechnological spaces. In this context, we have recently described the use of Pcs-virus nanofibers as heterogeneous catalysts for continuous-flow photooxidation processes (*Adv. Mater.* **2019**, 31, 1902582), and the on-surface synthesis and characterization of triply-fused Por-graphene nanoribbon hybrids (*Angew. Chem. Int. Ed.* **2020**, 59, 1334 and *Angew. Chem. Int. Ed.* **2021**, 60, DOI: 10.1002/anie.202105350).





# Covalent Organic Frameworks

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

## GROUP LEADER

**Prof. Félix Zamora**  
Associate Research Professor

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

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

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0000-0001-7529-5120

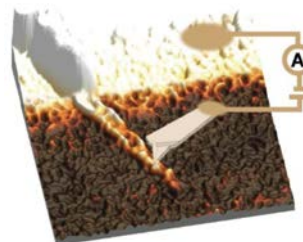
**Researcher ID:**  
E-6265-2014



## 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>

### GROUP LEADER

#### 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.





# Functional Organic Materials Hybrid Nanomaterials

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

## GROUP LEADER

**Dr. Beatriz H. Juárez**

Associate Researcher

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

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

## ORCID:

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## Researcher ID:

G-7066-2011

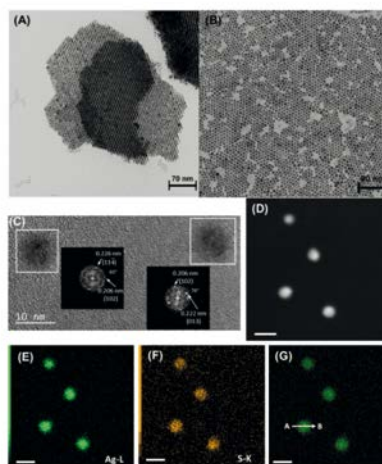
L-5896-2017

## PhD STUDENT

Andrés Solana

## 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.



programme

# Time Resolved Spectroscopies

Programme Manager: Prof. Johannes Gierschner

## Research lines

Photophysics of  
Organic and Hybrid  
Supramolecular  
Nanosystems

Prof. Johannes Gierschner

Nanooptics  
and Nanoacoustics

Prof. Reinhold Wannemacher

Pump-probe  
Photoinduced Absorption  
Spectroscopy

Dr. Juan Cabanillas González

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



## About the programme

The programme deals with phenomena in which either the (acoustic or optical) radiation or the matter are confined at sub-micrometre dimensions. In nanoacoustics, phase-sensitive acoustic microscopy, imaging, and non-destructive testing are developed, while the field of nanophotonics is both a Nobel Prize-winning science and a multibillion-dollar industry, underpinning applications such as telecommunications, data storage, and materials processing. Nanostructures and nanostructured materials exhibit fascinating optical response, and nanoscale optics have already shown many surprises, such as extraordinary optical transmission, superlensing, giant field enhancement, optical trapping, and imaging with resolution far beyond the diffraction limit. Researchers in this Programme have also explored semiconductor materials as advantageous candidates to be the physical basis of storage and manipulation of quantum information. The growth and characterisation of semiconductor nanostructures, and photonic devices, such as LEDs, Lasers, pillars and photonic crystal cavities is also relevant for activities in Programme 1). The scientists in this Programme have also developed optical microscopy in the near and far field, optical spectroscopy with coherent and nonlinear techniques, Raman and FTIR spectroscopy and spectroscopic SNOM.



# Photophysics of Organic & Hybrid Supramolecular Nanosystems

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

## GROUP LEADER

**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



## POSTDOCS

**Dr. Kumar Behera Santosh**  
Indian Institute of Science  
Bangalore, India

## VISITING RESEARCHER

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

## PhD STUDENTS

**Juan Carlos Roldao Liangxuan Wang,**  
University of Tübingen  
(01/03/2020-31/08/2020)

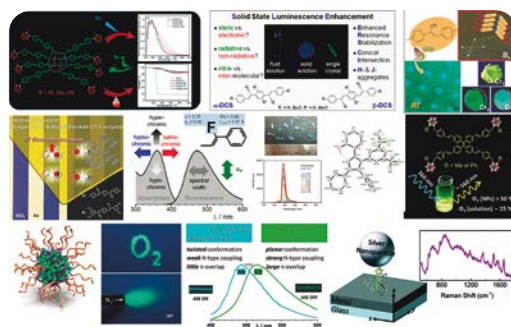
## MSC

**Sebastian Alonso Javier Enrique**  
Uppsala University  
14/09/2020 -06/11/2020  
**Liangxuan Wang**  
University of Tübingen,  
01/03/2020 -  
31/08/2020

## 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.

- 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.
- 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.
- 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.





# Nanooptics and Nanoacoustics

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

## GROUP LEADER

**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 STUDENTS

**Sergio Ramírez**

**Yansheng Liu**  
(co-supervised with Dr. Luo Feng)

## RESEARCH ASSISTANT

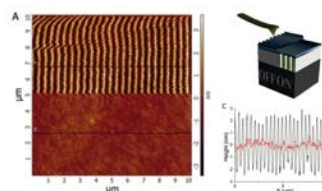
**Sergio Iglesias**  
(co-supervised with Dr. J. Cabanillas)

**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



# Pump-probe Photoinduced Absorption Spectroscopy

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

## GROUP LEADER

### 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



## POSTDOCS

**Dr. Abasi Abudulimu**  
Universidad Autonoma de Madrid, Spain

**Dr. Víctor Vega**  
Jožef Stefan Institute, Ljubljana, Slovenia

## PHD STUDENTS

**Chen Sun**  
**Ahmad Sousaraei**  
**Javier Álvarez**  
**Saúl García**

## RESEARCH ASSISTANTS

**Sergio Iglesias**  
(co-supervised with Dr. R. Wannemacher)

**Jorge González**  
(co-supervised with Dr. R. Wannemacher)

## Research lines

- 1. Conjugated polymers for photonics:** relation between structure and light amplification properties. We study the optical gain and stimulated emission properties of conjugated polymers with femtosecond transient absorption spectroscopy. We focus on chemical structures designed to promote optical gain upon reducing inter-chain interactions. Suppression of loss mechanisms like exciton-exciton annihilation, or polaron absorption and promotion of strong host-guest interactions on polymer mixtures are crucial for outstanding light amplifying properties.
- 2. Conjugated polymer waveguides and laser resonators.** We use soft nanoimprint lithography to transfer patterns onto flexible substrates subsequently coated with conjugated polymer. Upon choosing the appropriate pitch for the periodic pattern we can achieve confinement of the emission in the conjugated polymer film and amplification of the optical cavity modes. This research line is carried out in collaboration with the group of Nanostructured Functional Surfaces at IMDEA Nanociencia.
- 3. Fluorescent chemosensors.** We investigate the use of fluorescence, amplified spontaneous emission and laser action in cavity resonators as transduction signal for sensing analytes with high sensitivity in the gas or liquid phase. For this purpose we exploit the luminescent properties of conjugated polymers, organic dyes and porous metal-organic frameworks processed in films and composites.





# Nanostructured Photovoltaics

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

## GROUP LEADER

### 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



## PHD STUDENTS

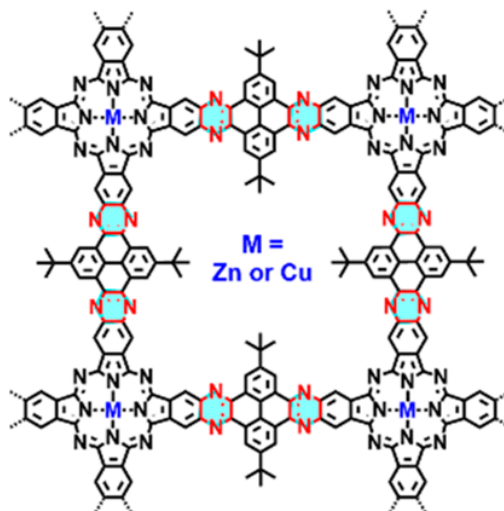
Sergio Revuelta

Miguel Ángel Pulido

## Research lines

1. Charge carrier dynamics at interfaces.
2. Charge carrier transport in organic, inorganic and hybrid materials and heterostructures Time resolved THz spectroscopy Solar Energy conversion: photovoltaics and photocatalysis 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>

## GROUP LEADER

### 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:

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#### Researcher ID:

J-5138-2014



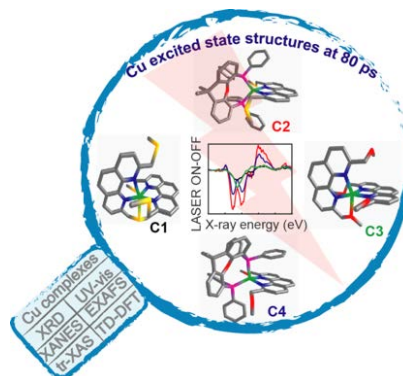
## RESEARCH ASSISTANTS

Sirma Iglesias  
Marina Córdoba

## 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>

## GROUP LEADER

**Prof. Fernando Martín**  
Associate Research Professor

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

**Double affiliation:** Universidad Autónoma de Madrid. Spain

**Código Orcid:**  
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**Researcher ID:**  
C-3972-2014



## POSTDOCS

**Dr. Michele Pisarra**  
University of Calabria, Italy

**Dr. Alberto González Castrillo**

**Dr. Juan José Omiste**  
University of Toronto, Canada

**Dr. Gilbert Grell**  
Universität Rostock,  
Germany

**Dr. Etienne Plesiat**  
Universidad Autónoma de Madrid, Spain

## PhD STUDENTS

**Kilian Arteaga**

**Jorge Delgado**

**Francisco Fernández**

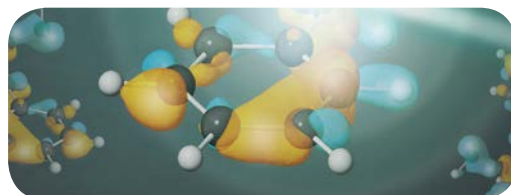
**Joel Gabriel Fallaque**

## 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>

## GROUP LEADER

**Prof. Luis Bañares**  
Associate Research Professor

PhD: Universidad Complutense de Madrid, Spain

Double Affiliation: Universidad Complutense de Madrid, Spain

ORCID:  
0000-0002-0777-2375

Researcher ID:  
B-7922-2014



## POSTDOCS

Dr. Sonia Marggi  
Dr. Sanat Ghosh  
Dr. David Chicharro  
Dr. Hugo Dacasa

## PhD STUDENTS

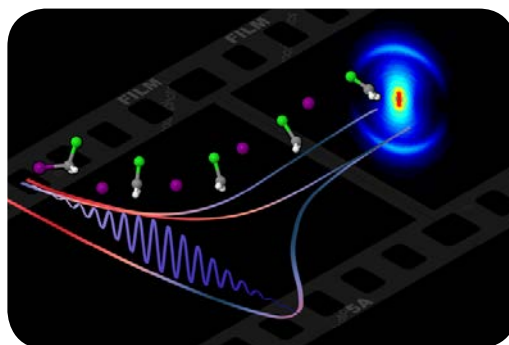
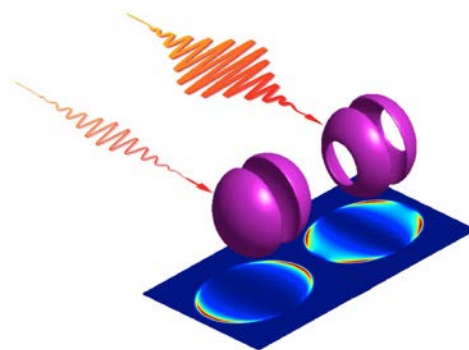
Marta Murillo  
Olivia Borrell

## 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>

## GROUP LEADER

### Prof. Wojciech Gawelda

Associate Research Professor

PhD: Ecole Polytechnique Fédérale de Lausanne, Switzerland

**Double Affiliation:** Distinguished “Beatriz Galindo” Professor, Department of Chemistry, Universidad Autónoma de Madrid  
**Previous Position:** European XFEL, Schenefeld, Germany

#### ORCID:

0000-0001-7824-9197

#### Researcher ID:

B-7878-2014



## POSTDOC

### Dr. Andrés Burgos

Universidad Autónoma de Madrid, Spain

## PhD STUDENT

### Tae Kyu Choi

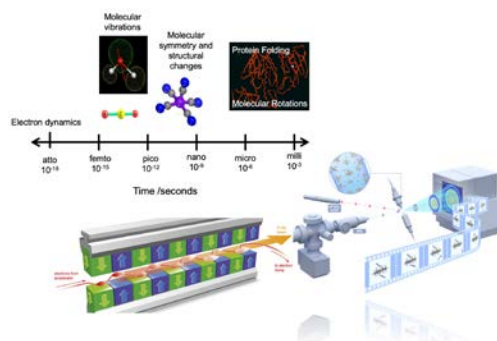
University of Hamburg/  
European XFEL, Germany

## 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



programme

# Atomic Scale Quantum Materials

Programme Manager: Prof. Rodolfo Miranda

## Research lines

**Scanning Probe  
Microscopies and  
Surfaces**

Prof. Rodolfo Miranda

**Theoretical Modelling**

Prof. Francisco Guinea

**Nanoarchitectures  
at surfaces**

Dr. David Écija

**Spin-Polarized low T STM**

Dr. Fabián Calleja

**Topological surfaces  
states in quantum  
materials**

Dr. Manuela Garnica

**Molecular Electronics**

Dr. Edmund Leary

**Imaging of 2D Materials**

Prof. Amadeo L.  
Vázquez de Parga

**Photonic STM**

Dr. Roberto Otero

**Thermopower  
at the Nanoscale**

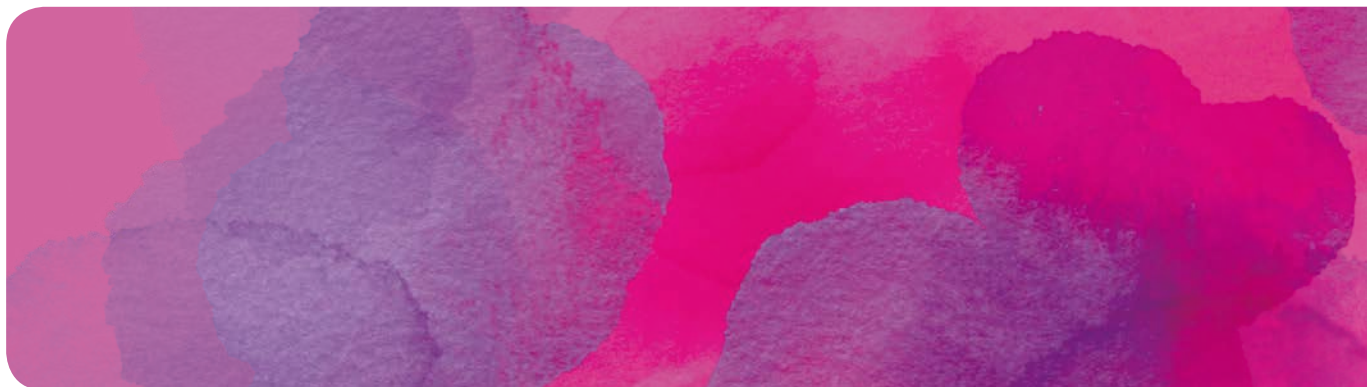
Prof. Nicolas Agrait

**Theoretical Study of  
Molecules on Surfaces**

Prof. Manuel Alcamí

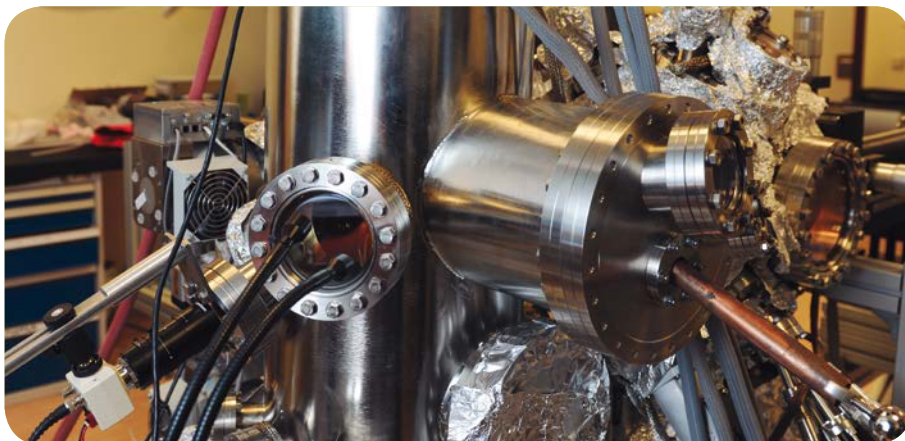
**Surface Reactivity**

Prof. Juan M. Rojo



## About the programme

The use of advanced microscopies and spectroscopies with atomic resolution is essential to characterize matter at the nanoscale. 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.



## Scanning Probe Microscopies and Surfaces

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

### GROUP LEADER

**Prof. Rodolfo Miranda**  
Associate Research Professor

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

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

**ORCID:**

0000-0002-1064-6724

**Researcher ID:**

7102041777



**Dr. Miguel Ángel Valbuena**

ICN2, Barcelona, Spain

**Dr. Mariona Cabero**

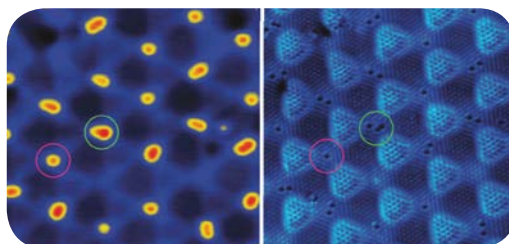
Universidad Complutense de Madrid, Spain

### 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>

### GROUP LEADER

#### **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 Ferreira**

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.

# Nanoarchitectures at Surfaces

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

## GROUP LEADER

**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. Koen Lauwaet**

Researcher  
ICMM-CSIC, Spain

**Dr. Jose Ignacio Urgel**

Technische Universität München, Germany

## POSTDOCS

**Dr. Sofia de Oliveira**

Universidade Federal de Minas Gerais, Brazil

**Dr. Ana Sánchez Grande**

IMDEA Nanociencia

## PhD STUDENTS

**Daniel Moreno**

**Cristina Martin**

**Kalyan Biswas**

## TECHNICIAN

**Isabel Ortiz**

## VISITOR

**Dr. Jose Maria Gallego**

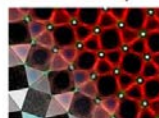
ICMM-CSIC, Spain

## Research lines

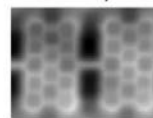
Our group is focused on the design of organic products and nanomaterials on surfaces, including three main lines of research:

- 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>

## GROUP LEADER

**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

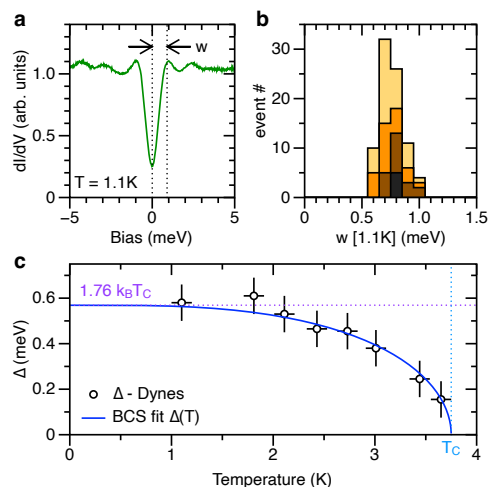
**Cosme González**

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

## 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. Extrapolation to other novel 2D materials.

We have created and characterized a superconducting (SC) nanostructure at the apex of a tungsten STM tip. The resulting SC gap width at 1 K (panel a) was reproduced in over 80 different tips (panel b), with a critical temperature around 3.5 K (panel c). *Appl. Phys. Lett.* 115, 073108 (2019); doi: 10.1063/1.5097694



# Topological surfaces states in quantum materials

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

## GROUP LEADER

### 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)

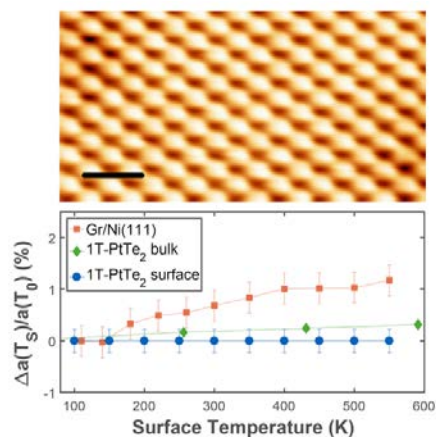
### Joan Ripoll

## Research lines

Our research interests deal with 2D materials and new topological states of matter. In recent years, topological materials have attracted a wide range of attention not only for the possibility to study many aspect of fundamental physics but also because of their potential applications.

- Epitaxial growth.
- Graphene.
- Topological materials.
- Low-Temperature Scanning Tunnelling Microscopy.

“Experimental determination of surface thermal expansion and electron–phonon coupling constant of 1T-PtTe<sub>2</sub>” Gloria Anemone, Manuela Garnica *et al.* 2D Materials 7, 025007





# Molecular Electronics

## GROUP LEADER

### Dr. Edmund Leary

Assistant Research Prof.  
(tenure track)

PhD: University of Liverpool, UK

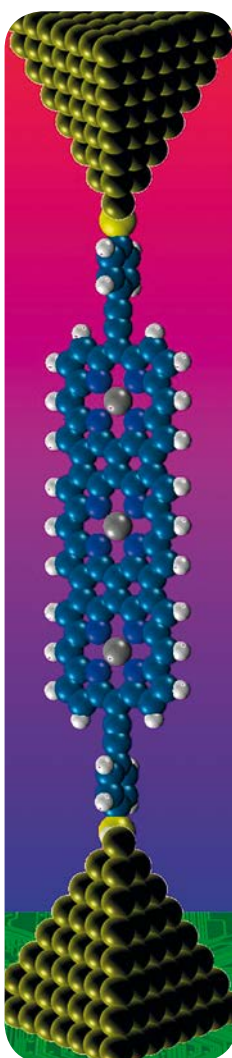
Previous Position: University of  
Liverpool, UK

#### ORCID:

0000-0001-7541-5997

#### Researcher ID:

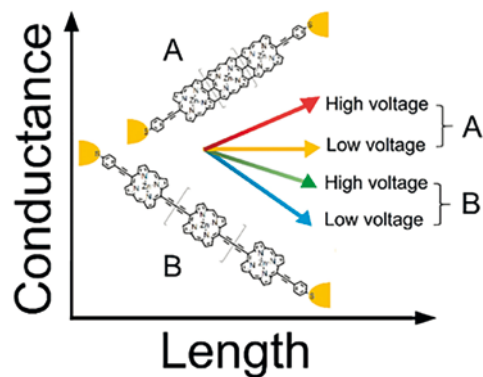
L-1066-2018



## Research lines

1. Structure-property relationships in electron transport through single molecules.
2. Effective binding groups for the robust attachment of molecules to electrodes.
3. Aromaticity and anti-aromaticity and their effects on molecular transport.
4. Quantum Interference.

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



## Imaging of 2D Materials

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

### GROUP LEADER

**Prof. Amadeo L. Vázquez de Parga**

Associate Research Professor

PhD: Universidad Autónoma de Madrid, Spain

Double Affiliation: Universidad Autónoma de Madrid, Spain

Researcher ID:  
L-2418-2013



### PhD STUDENTS

**Pablo Casado**

(co-supervised with Dr. Garnica)

**Cosme González**

(co-supervised with Dr. Calleja)

**Iván Martínez**

### Research lines

We are exploring the properties of 2D materials by means of low temperature scanning tunnelling microscopy and spectroscopy (LT-STM/STS) in ultra-high vacuum conditions. We grow the 2D materials by means of molecular beam epitaxy (MBE), and we are focused on the following research lines:

- 1. Chemistry of 2D materials.** We are exploring the chemistry of 2D materials in ultra-high vacuum conditions.
- 2. Tuning the electronic structure of 2D materials.** We are interested in the influence of the substrate on the electronic properties of the 2D materials.
- 3. Superconductivity.** We are interested in the superconductivity on 2D materials, the influence of the substrate, doping level and strain.
- 4. Integration of 2D material in devices.** Taking advantage of the clean room facilities of the Campus of Excellence UAM-CSIC located in the building of IMDEA Nanoscience, we are exploring the integration of 2D materials on electronic devices.



## Photonic STM

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

### GROUP LEADER

#### 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.

# Thermopower at the Nanoscale

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

## GROUP LEADER

**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

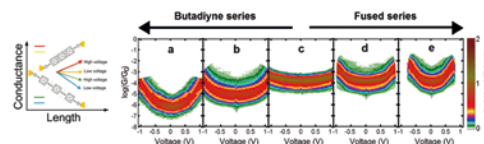


## Research lines

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>

### GROUP LEADER

**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.

programme

# NanoMagnetism

Programme Manager: Prof. Julio Camarero

## Research lines

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

**Rare-Earth free  
Permanent Magnets**  
Dr. Alberto Bollero

**Growth &  
Nanostructuring**  
Dr. Feng Luo

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

**SpinOrbitronics**  
Dr. Paolo Perna

**Epitaxial Growth**  
Dr. Miguel Ángel Niño

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

**Electrodeposited  
nanowires**  
Dr. Lucas Pérez

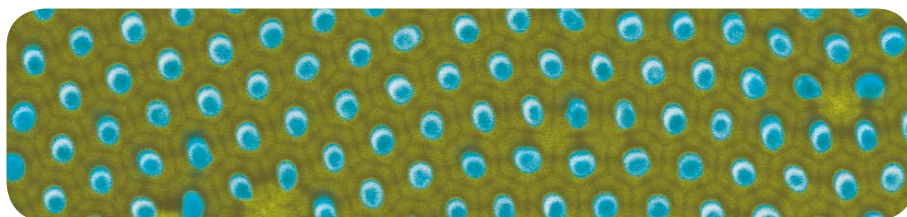


## About the programme

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.

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), and their magnetoresistance responses. 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>

### GROUP LEADER

**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



### POSTDOCS

**Dr. José Luis F. Cuñado**  
Universidad Autónoma de Madrid, Spain

**Dr. Rubén Guerrero**  
Institut d'Electronique Fondamentale (IEF)  
Universite Paris- Sud, France  
(co-supervised with Dr. P. Perna)

### PHD STUDENTS

**José Manuel Díez**

**Adrián Gudín**

**Beatriz Muñiz**

### MSC

**Javier Castillo**  
(Co-Supervised by Dr. Ana Espinosa)  
Universidad Autonoma de Madrid, Spain

## 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 magnetoresponse.

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) & nanostructuring.
- 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.



# Rare-Earth free Permanent Magnets

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

## GROUP LEADER

### Prof. Alberto Bollero

Senior Research Prof.

PhD: Technical University of Dresden

Previous Position: SPINTEC-CEA, France

## ORCID:

0000-0002-3282-0981

## Researcher ID:

C-3217-2017



## POSTDOCS

### Dr. Ester M. Palmero

ICMM-CSIC, Spain

### Dr. Cristina Navío

Universidad Autónoma de Madrid, Spain

### Dr. Javier Rial

IMDEA Nanociencia

### Dr. Clémentine Bidaud

Université de Haute-Alsace, France

## PhD STUDENTS

### Melek Villanueva

### Daniel Casaleiz

### Carla Muñoz

### Jimena Soler

### Alonso José Campos

## TECHNICIANS

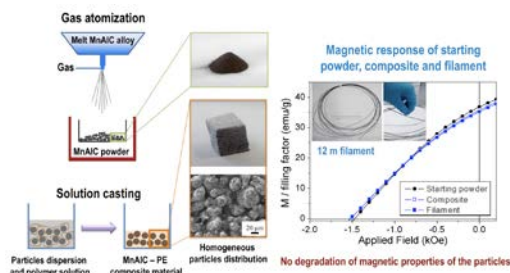
### Javier de Vicente

### Cristina María Montero

## Research lines

1. Fundamental and applied aspects of permanent magnets (PMs) with no or reduced content of rare-earths: MnAl-based, MnBi, L10-FeNi, ferrites, hybrid ferrite/NdFeB.
  - (a) Industrial collaborations: Höganäs (Sweden), IMA (Barcelona), RAMEM (Madrid)...
  - (b) Projects under international Calls: 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 of PMs.

Development of permanent magnet MnAlC/polymer composites and flexible filament for bonding and 3D-printing technologies. *Sci. Technol. Adv. Mater.* 2018, 19, 465 (Open Access)



# Growth & Nanostructuring

Webpage: <http://www.imdeananociencia.org/home-en/people/item/feng-luo>

## GROUP LEADER

**Prof. Feng Luo**  
Senior Research Prof.

PhD: Peking University, China  
Previous Position: Peking University, China

Researcher ID:  
E-3683-2012



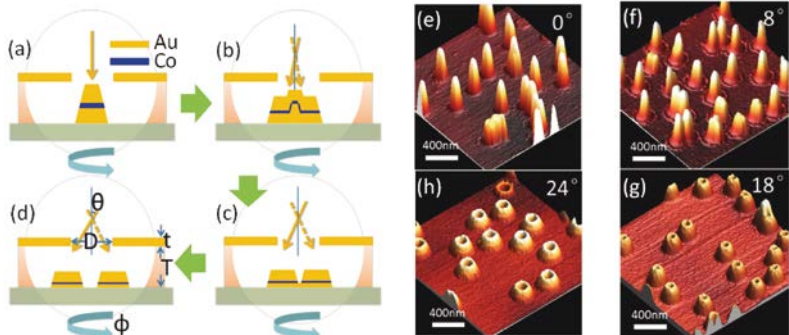
## PHD STUDENT

**Yansheng Liu**  
(co-supervised with Dr. R. Wannemacher)

## Research lines

1. Micro/Nano Fabrication and Ultra-Precision Manufacturing for Applications in Magnetic Hard Disk Storage, Magnetic Random Access Memory (MRAM) and Magneto-Optical Sensors.
2. Tuning Physical Properties by Design and Controlling: Interface Engineering at Atomic Scale and Lithography Patterning.
3. Advanced Characterization Techniques Based on X-ray and Electrons.

Morphology tuning of a series of Au/Co/Au nanostructures which gradually evolve from disk to ring allows controlling their optical and magneto-optical spectral responses in the visible and near infrared ranges. Bimodal resonant behavior in the optical and MO activity is observed, and by either tuning the morphological parameters, or the distribution of the ferromagnetic constituent, the spectral response of MO activity shows a good tunability and fine control, not only in a wide wavelength range, but also in the relative ratio of the Low-energy and High-energy modes, which has great potential in detailed design for telecommunication and sensor devices.





# Technological and biomedical applications of magnetic nanoparticles

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

## GROUP LEADER

**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 STUDENTS

Claudia Lozano

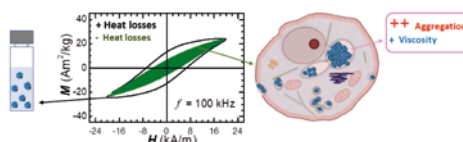
## RESEARCH ASSISTANTS

Diego Gómez

Lydia Abellan

## 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: <http://nanociencia.imdea.org/spinorbitronics/group-home>

## GROUP LEADER

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

**PhD:** University of Caen Basse-Normandie, France & University of Cassino, Italy

**Previous Position:** CNR-SPIN, Italy

**Researcher ID:**  
C-3862-2012



## POSTDOCS

**Dr. Rubén Guerrero**  
Institut d'Electronique Fondamentale (IEF)  
Universite Paris- Sud, France  
(co-supervised with Dr. J. Camarero)

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

**Dr. Iciar Aray**

## PhD STUDENTS

**Leticia de Melo**

**Pablo Olleros**

## TECHNICIAN

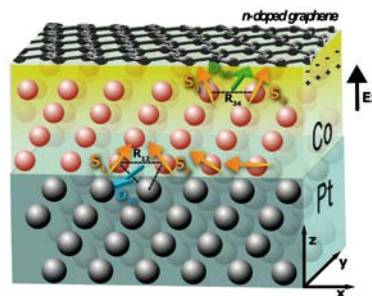
**Sergio de las Heras**

## Research lines

The group focuses the interests on solid-state physics and material science of low dimensional magnetic materials, covering epitaxial growth, surface/interface and magnetotransport characterization, as well as nanofabrication.

The main research lines of the group are:

- Spin-Orbitronics functional interfaces:** investigating the growth and the structural, surface and magneto-transport properties of heterostructures in which spin-orbit coupling plays an important role. These include thin films and multilayer stacks, combining ferromagnetic (FM), antiferromagnetic (AFM); perpendicular magnetic anisotropy (PMA) systems with antisymmetric Dzyaloshinskii-Moriya interaction (DMI), as well as molecules and graphene.
- Oxide-Spintronics:** engineering artificially the surface/interface of nanostructures based on perovskite oxides (which show a wide variety of properties as half-metallicity, dielectricity, ferroelectricity, multiferroicity), with the aim to tailor their spin-dependent transport characteristics and merge in a single device the functionalities of their individual constituents.







## Epitaxial Growth

Webpage: <http://www.imdeananociencia.org/research/research-programs?view=article&id=330:nanomagnetism>

### GROUP LEADER

#### Dr. Miguel Ángel Niño

Assistant Research Prof.  
(tenure track)

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

**Previous Position:** Elettra Synchrotron Radiation Facility (Trieste), Italy

#### Researcher ID:

M-2571-2014



### PhD STUDENT

Juan Carlos Martin

### Research lines

- 1. Surface reactivity:** We investigate the role of different surfaces in the synthesis of organic molecules in prebiotic chemistry, as well as polymerization processes on metallic and oxide surfaces ("Reactivity of a FeS Surface under Room Temperature Exposure to Nitrogen and H<sub>2</sub>S"). As well we are interested in catalytic processes, like water splitting and OER reaction at FeNi oxide surfaces.
- 2. Chirality:** We study the interplay between the chirality and spin filtering effects of thin molecular films, with the aim to develop new magnetic materials for organic spin valves and sensors ("Enantiosensitive nonbonding of chiral molecules on a magnetic substrate investigated by means of electron spectroscopies").
- 3. Magnetism:** As part of the Nanomagnetism programme we are interested in magnetic effects of metallic and organic thin films, in particular studying the influence of the magnetic anisotropy on properties of interest for device applications ("Magnetic ordering in an (Fe<sub>0.2</sub>Cr<sub>0.8</sub>)<sub>1.5</sub>[Cr(CN)<sub>6</sub>] Prussian blue analogue studied with synchrotron radiation based spectroscopies").
- 4. Growth of molecular films:** We study the improvement of surfaces and interfaces of thin films of organic materials for solar cell ("Combinatorial optimization of evaporated bilayer small molecule organic solar cells through orthogonal thickness gradients").

# Magneto-photothermia

## GROUP LEADER

### 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:

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#### Researcher ID:

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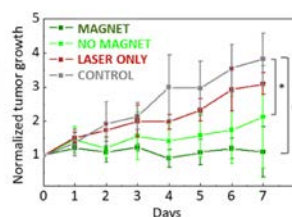
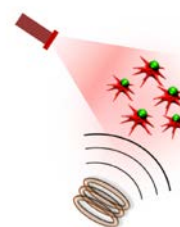
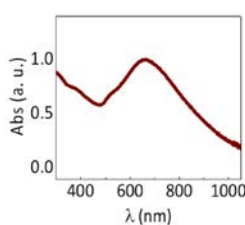
## PHD STUDENT

Rosalía López

## 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.





# Electrodeposited nanowires

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

## GROUP LEADER

### 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 ASSISTANT

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.

programme

# Nanomedicine

Programme Manager: Prof. Rodolfo Miranda

## Research lines

### Neural Interfaces

Dr. M<sup>a</sup> Teresa González

### Metallo drugs

Dr. Ana Pizarro

### Hyperthermia

Dr. Daniel Ortega

### Nucleic Acids and Nanoparticles in Nanomedicine

Prof. Álvaro Somoza

### Synthesis of magnetic nanoparticles

Dr. Gorka Salas

### Intracellular temperature measurements

Dr. S. Thompson

### Engineering Biofunctional Nanostructures

Dr. Aitziber L. Cortajarena

### Magnetic Nanoparticles in Biomedicine. Cell-particle Interactions

Prof. Ángeles Villanueva



## About the programme

The Nanomedicine Programme is focused on the development of novel nanotechnologies for medical applications that will result in better, more efficient, and cost-effective therapeutic and diagnostic tools. One of the important areas is the preparation and use of magnetic nanoparticles (MNPs) in medicine, in particular for cancer treatment and diagnosis. MNPs selectively target tumours for multimodal treatment as drug nanocarriers and heating inductors. This research is highly interdisciplinary, combining the range of expertise necessary to successfully develop this research from the nanoparticle synthesis to the pre-clinical applications. In search of efficiency in the fight against cancer, another area within Nanomedicine is addressing the need to reduce toxic side effects associated with cancer therapies 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 is a research area that aims to exploit the higher sensitivity and specificity of nanostructure-based diagnostics platforms. Researchers at IMDEA Nanociencia are developing distinct diagnostic tools able to detect biological targets. One example is the use of nucleic acid conjugated gold nanoparticles to detect different biomarkers involved in diseases such as uveal melanoma, pancreatic cancer and Duchenne muscular dystrophy. Another area of interest is the use of nanotechnology-based solutions to the growing problem of antibiotic-resistant bacteria. Nanostructures and nanoparticles 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.

# Neural Interfaces

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

## GROUP LEADER

**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



## POSTDOC

**Dr. Isidoro Martínez**  
Universidad Autonoma de Madrid, Spain

## 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



# Metallo drugs

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

## GROUP LEADER

### 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. Federica Battistin

University of Trieste, Italy

## PhD STUDENTS

### Ana Cristina Carrasco

### Sonia Infante

### Arturo Villechenous

### Claudia Pierina Cardozo

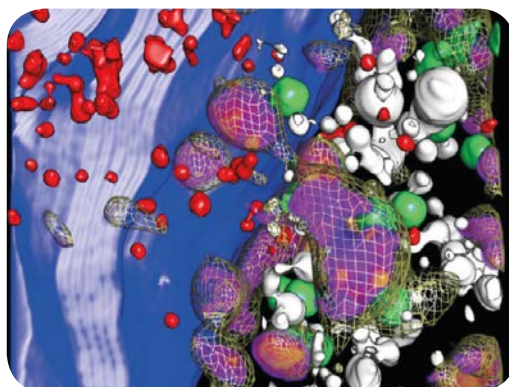
## TECHNICIAN

### Catarina Leis Malvar

## Research lines

1. Exploit metal coordination and organometallic chemistry principles to design novel potent metallo drugs.
2. Development of new methods to describe the chemical interactions of our systems with the intracellular components at the nanoscale.
3. Use of recent developments in nanomedicine to load our metallo drugs to a variety of nano-systems to provide, for example, heat-mediated amplified artificial catalysis.

A new family of iridium half-sandwich drug candidates has been designed that are exceptionally potent in a number of cancer cell lines. By using 3D cryo soft X-ray and fluorescence tomographies, correlatively on the same cryopreserved cell, we have localized and quantified our new iridium anticancer agent exclusively in the cell mitochondria. See: **Unambiguous Intracellular Localization and Quantification of a Potent Iridium Anticancer Compound by Correlative 3D Cryo X-Ray Imaging.** 2020, *Angew. Chem. Int. Ed.*, 59, 1270-1278.



3D section of a breast cancer cryopreserved cell showing iridium density (colour palette) inside the mitochondria (yellow mesh).

# Nucleic Acids and Nanoparticles in Nanomedicine

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

## GROUP LEADER

### Prof. Álvaro Somoza

Senior Research Prof.

PhD: Universidad Autónoma de Madrid, Spain

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

#### Orcid

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#### 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

## PHD STUDENTS

Ana Belén Latorre

Paula Milán

Eduardo García

Ciro Rodríguez Díaz

Demian Pardo

Nuria Lafuente Gómez

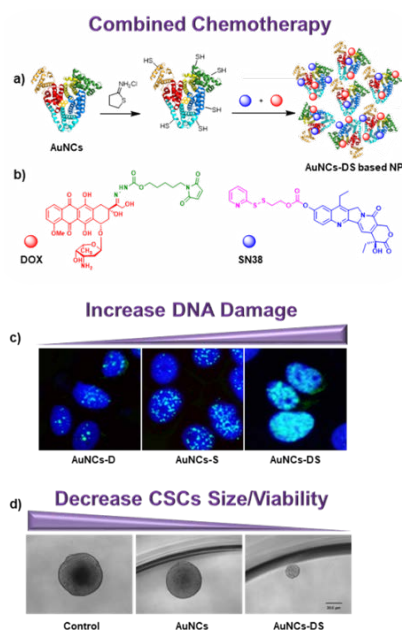
Catarina Castanheira

Rama Prajapati

## 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







# Synthesis of Magnetic Nanoparticles

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

## GROUP LEADER

### Dr. Gorka Salas

Assistant Research Prof.  
(tenure track)

PhD: Universidad de Valladolid,  
Spain

Previous Position: CNRS, France

#### ORCID:

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#### Researcher ID:

F-6503-2011



## PhD STUDENT

David García

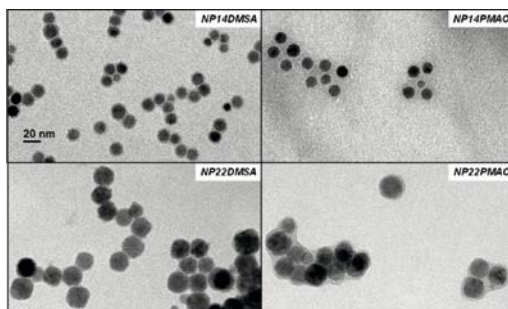
## RESEARCH ASSISTANT

Monica Dhanjani

Victoria López

## Research lines

1. Our research is mainly focused in the preparation of magnetic hybrid nanostructures that could be used for medical imaging and treatment of tumors. That includes understanding the procedures that lead to well controlled inorganic hybrids that can respond different stimuli and developing general synthetic routes for different magnetic materials. Magnetic nanoparticles are being extensively studied worldwide as contrast agents for medical imaging and as nanoheaters under alternating magnetic fields. 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 in biomedicine. Another topic of interest, also for biomedical applications, is the use of hybrid magnetic nanocomposites as antibacterial agents, given the growing concerns about bacterial resistance and the lack of alternatives to antibiotics.
2. We are also exploring the use of magnetically recoverable nanocatalysts for environmental applications. Magnetic nanostructures offer the possibility of acting as catalysts or as platforms that allow the recovery of a bound catalyst.



# Intracellular temperature measurements

## GROUP LEADER

**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:

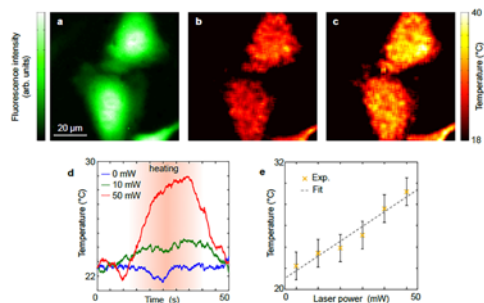
P-4606-2017



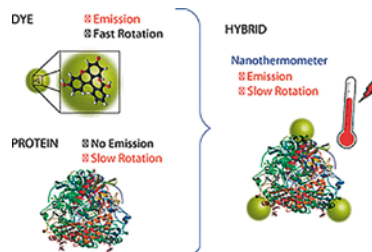
## Research lines

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.





# Engineering Biofunctional Nanostructures

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

## GROUP LEADER

**Prof. Aitziber L. Cortajarena**

Associate Research Professor

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

**Previous Position:** Yale University, USA

### ORCID:

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### Researcher ID:

J-6202-2012



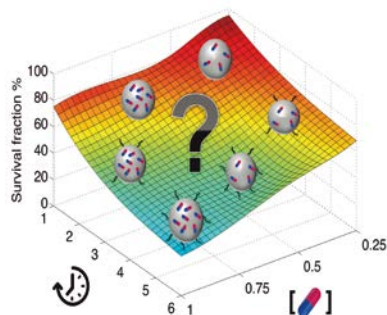
## RESEARCH ASSISTANT

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**).



## Magnetic Nanoparticles In Biomedicine. Cell-Particle Interactions

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

### GROUP LEADER

#### Prof. Ángeles Villanueva

Associate Research Professor

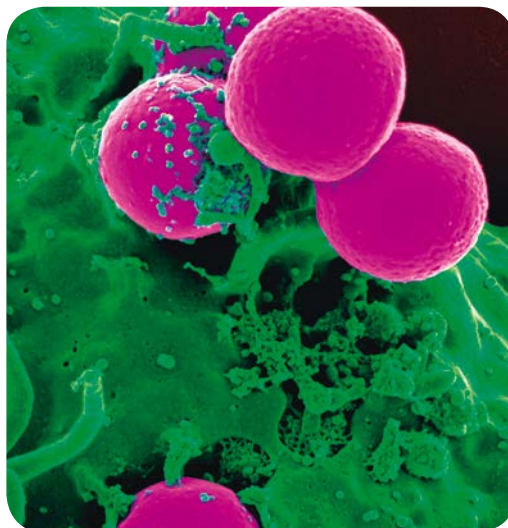
PhD: Universidad Autónoma de Madrid, Spain

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.





# Hyperthermia

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

## GROUP LEADER

### 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

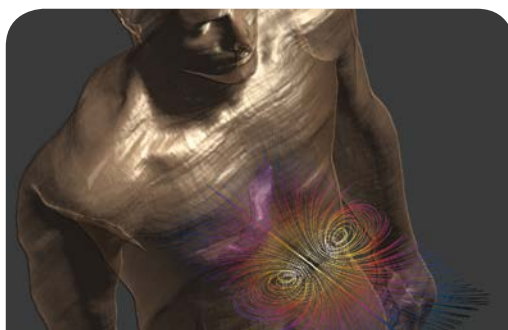
## RESEACH ASSISTANTS

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*.



programme

# Nanobiosystems

Programme Manager: Prof. J.L. Carrascosa

## Research lines

**Nanobiosystems**  
Prof. J.L. Carrascosa

**Protein Engineering**  
Dr. Begoña Sot

**Mechanical properties  
of Biostructures**  
Dr. Johann Mertens

**Advanced fluorescence  
nanoscopy**  
Dr. Cristina Flors

**Molecular Motors  
Manipulation Lab**  
Dr. Borja Ibarra



## About the programme

This programme aims at studying biological nanomachines, their assembly, structure and functional properties, as well as their interaction with defined substrates to build synthetic tools. In the area of single molecule analysis of macromolecular aggregates, there are groups working on protein engineering, computational chemistry, AFM analysis of macromolecular complexes, force spectroscopy analysis and manipulation of macromolecules and their aggregates, the study of nanomechanical properties of biological complexes of different complexities and optical trapping-based approaches to study the behaviour of single biological nanomotors. Other systems under study are tailor-made polypeptides of increasing complexity designed to dissect relationships between molecular structure and functional properties. A second area of interest in this Programme is the organization of macromolecular complexes on well-defined substrates. Biological membranes, the protein folding and viral assembly pathways, the bacterial cytoskeleton and the DNA structure are examples of self-organizing systems under study with highly specialized functions and properties.



# Nanobiosystems

Webpage: <http://macromolassembles.wixsite.com/carrascosalab>

## GROUP LEADER

### Prof. José L. Carrascosa

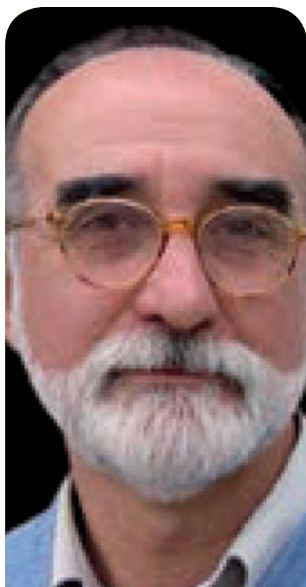
Associate Research Professor

PhD: Universidad Complutense de Madrid, Spain

Double Affiliation: Unidad de Nanobiotecnología. Joint Unit IMDEA Nanociencia-CNB-CSIC

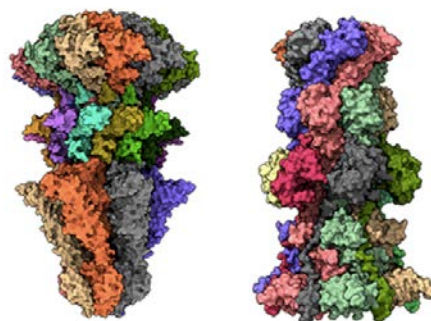
Researcher ID:

35481302900



## Research lines

Our group studies viral macromolecular complexes combining genetic, biochemical and structural approaches. Viruses are classical experimental systems to study basic biological principles and mechanisms. We use cryoelectron microscopy and computer three-dimensional image processing to obtain structures, at near atomic resolution, involved in bacteriophage T7 assembly and infection. With this technique, in combination with X-ray crystallography, we solved the structure of the portal protein that serves as a channel for DNA entry in the capsid in two different conformations allowing to decipher the mechanism of DNA retention during packaging. We studied also the tail machinery and other protein ejection complexes involved in different steps of the DNA delivery into the bacterial host. The study of bacteriophages has increased in the present days due to the bacterial antibiotic resistance. The understanding of the mechanism of infection of bacterial viruses could be essential to take advantage of their bacterial weapon efficacy for the implementation of new methods to fight against bacteria.







## Advanced fluorescence nanoscopy

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

### GROUP LEADER

#### Prof. Cristina Flors

Senior Research Prof.

PhD: Institut Químic de Sarrià,  
Spain

Previous Position: University of  
Edinburgh, Edinburgh, UK

#### ORCID:

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#### Researcher ID:

C-2123-2017

### POSTDOCS

#### Dr. Joaquim Torra

Institut Químic de Sarrià,  
Barcelona, Spain

#### Dr. Felipe Viela

UC Lovain, Belgium

#### Dr. Patricia Bondía

IMDEA Nanociencia

### PhD STUDENTS

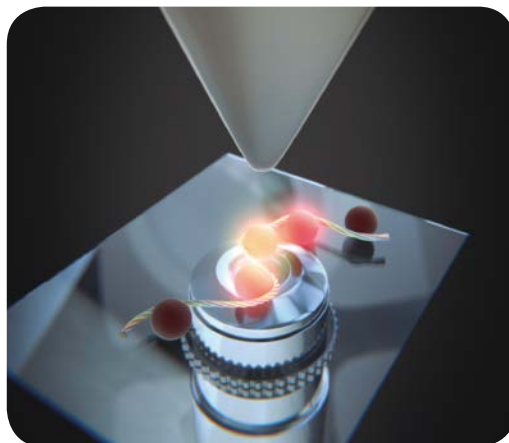
#### Adrián del Valle

#### 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 (Bondía et al, *Small* **2017**), the mechanisms of action of amyloid-targeting drugs (Bondía 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**)



# Protein Engineering

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

## GROUP LEADER

### Dr. Begoña Sot

Assistant Research Prof.  
(tenure track)

PhD: Universidad del País Vasco,  
Spain.

Previous position: CNB, Spain

### Researcher ID:

H-2882-2015



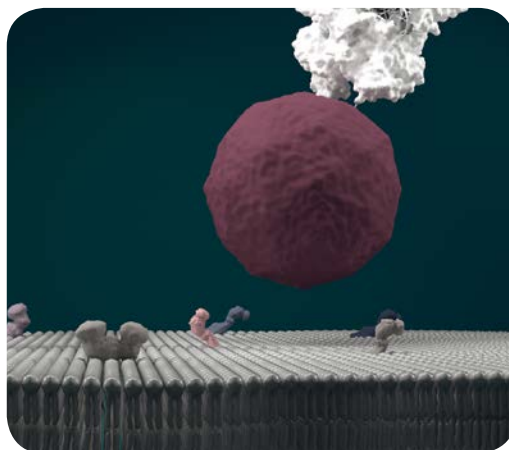
## PhD STUDENT

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.





# Molecular Motors Nanomanipulation Lab

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

## GROUP LEADER

### Dr. Borja Ibarra

Assistant Research Prof.  
(tenure track)

PhD: Universidad Autónoma Madrid

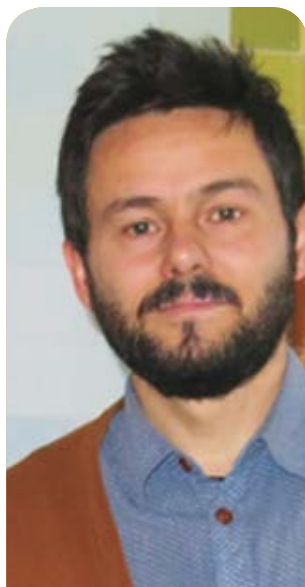
Previous Position: UC Berkeley,  
USA

#### ORCID:

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#### Researcher ID:

H-5840-2015



## ASSOCIATE RESEARCHER

### Dr. Francisco Javier Cao García

PhD: Universidad  
Complutense de Madrid

Double Affiliation:  
Universidad Complutense  
de Madrid

## PHD STUDENTS

### Katerina M. Lemishko

### Carlos Rodríguez

### Ismael Plaza

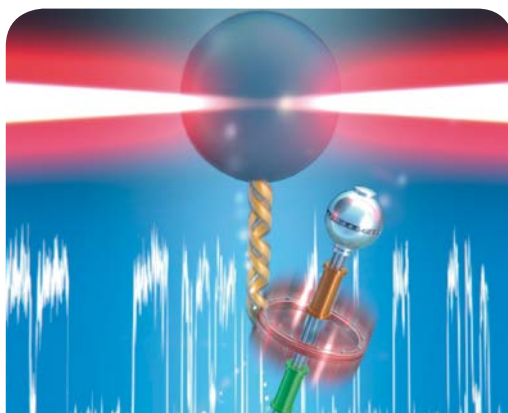
## MSC

### Nicolás Vivas

Universidad Autonoma  
de Madrid, Spain

## Research lines

1. 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.
2. 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).
3. 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).
4. Technology development. We are working to combine optical manipulation with temperature control systems. This exciting marriage of techniques will open up a wealth of new promising applications.



# Mechanical properties of Biostructures

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

## GROUP LEADER

### Dr. Johann Mertens

Assistant Research Prof.  
(tenure track)

PhD: University of Burgundy,  
France

Previous Position: Madrid  
Microelectronics Institute, Spain

ORCID:  
0000-0002-1312-8914

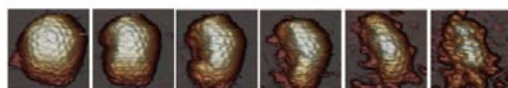
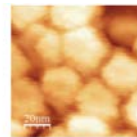
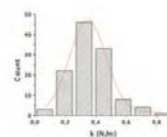
Researcher ID:  
I-4208-2015



## 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 news 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).





programme

# Nanofabrication

## Research lines

**Functional Surfaces**  
Prof. Isabel Rodríguez

**Applied Nanoelectronics**  
Dr. Ramón Bernardo

**Quantum Devices  
and Photonics**  
Dr. Daniel Granados

**Transport in 2D Systems**  
Prof. José Luis Vicent



# Functional Surfaces

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

## GROUP LEADER

**Prof. Isabel Rodríguez**  
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**Researcher ID:**  
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Université de Toulouse, CNRS, Toulouse, France

## PHD STUDENTS

**María Teresa Alameda**

**Alejandra Jacobo**

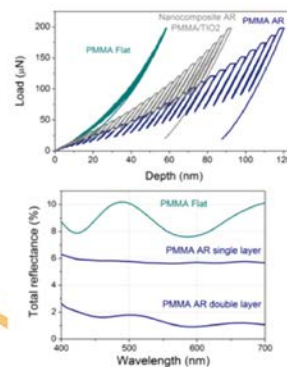
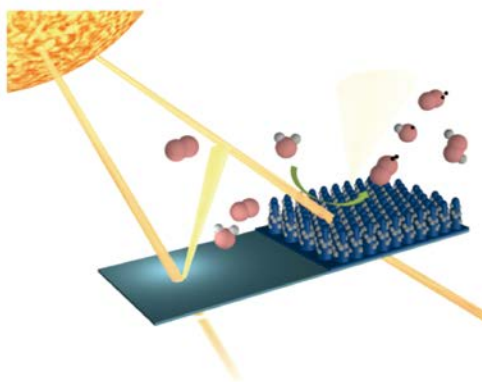
**Sergio Dávila**

**Miguel Esteban**

**Alberto Martín**

## Research lines

1. Nano-engineered functional surfaces for medical applications, particularly the development of biomimetic bactericidal functionalities and cell culture platforms for cell biomechanical assays.
2. Multifunctional surfaces. The programme is developing the methodology to impart onto polymer nanocomposites additional surface properties, particularly those of super-hydrophobicity and self-cleaning based on bio-inspired surface nanotexturing. The programme is also focused on up-scaling the methodology using Roll to roll nanoimprint technology.
3. Polymer nanoimprinting for optical applications such as polymer lasers and waveguides, antireflective surfaces and optical sensors in collaboration with the Organic Photophysics and Photonics group.







# Quantum Devices and Photonics

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

## GROUP LEADER

**Prof. Daniel Granados**

Senior Research Prof.

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

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## POSTDOCS

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National University of Singapore

**Dr. Fernando Jiménez**

IMDEA Nanociencia, Spain

## PhD STUDENTS

**Victor Marzoa**

**Marina Calero**

(co-supervised with Dr. Alicia Gomez)

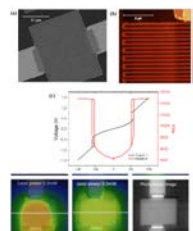
**Cristina García**

## RESEARCH ASSISTANT

**Julia García**

## 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.



# Applied Nanoelectronics

## GROUP LEADER

### Prof. Ramón Bernardo

Assistant Research Prof.  
(tenure track)

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Previous Position: Lancaster  
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#### Researcher ID:

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#### Scopus Author ID:

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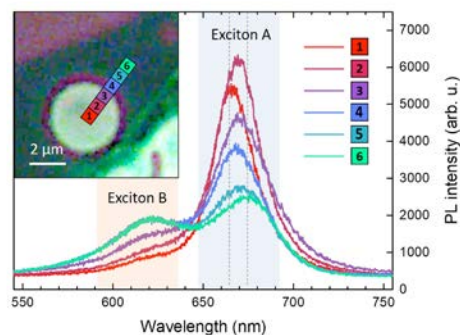
## PhD STUDENTS

Victor Marzoa

Cristina García

## 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.





# Transport in 2D Systems

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

## GROUP LEADER

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

**Double Affiliation:** Universidad Complutense de Madrid

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**Researcher ID:**  
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**Dr. Mariela Menghini**  
Researcher

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**Dr. Alicia Gómez**  
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**Double Affiliation:** CSIC-INTA, Torrejón de Ardoz

**Dr. Álvaro Muñoz Noval**  
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## PHD STUDENT

**Ignacio Figueruelo**

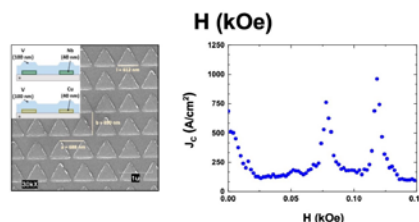
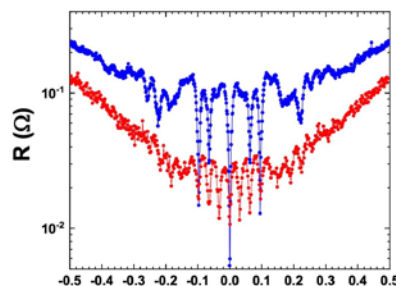
## MSC

**Gabriel Caballero**  
Universidad Complutense de Madrid

## Research lines

1. Nanostructured superconductors.
2. Magnetic nanostructures.
3. Vortex dynamics in superconductors.

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



## 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



**Dr. Sara de Lorenzo**  
PhD: Universidad de Barcelona, 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

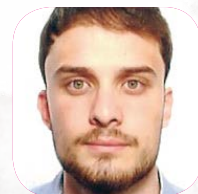


**Dr. Maria Acebrón**  
PhD: Universidad Autónoma de Madrid, Spain



**Mr. Andrés Valera**  
Technician

### Cryogenics



**Ivan Redondo**  
Technician



## Management



**Mr. Bonifacio Vega**  
General Manager



**Ms. Isabel Rodríguez**  
Administration  
and Finance Manager



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



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



**Dr. Mark William Davies**  
Industrial Liaison Manager



**Dr. Héctor Guerrero**  
Strategic Industrial  
Partnerships



**Dr. Elena Alonso**  
CDO. Project Manager



**Mr. Ignacio Torres**  
Projects Manager



**Ms. Mireia Gracia**  
Projects Manager



**Ms. Patricia López**  
RSO Project Manager



**Ms. Laura Lorente**  
Project Assistant



**Ms. Paloma Macua**  
Administrative Assistant



**Ms. Elena Pérez**  
Administrative Assistant



**Ms. Juana Hemoso**  
Administrative Project  
Assistant



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



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



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

# 3

## scientific report

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## 1. Publications (as of 14-12-2020)

- 1. The quantum chemistry of attosecond molecular science;** Palacios, Alicia; Martin, Fernando; *WIREs Comput Mol Sci.* 2020;10:e1430; <https://doi.org/10.1002/wcms.1430>
- 2. Matrix Encapsulation of Solution-Processed Thiophene-Based Fluorophores for Enhanced Red and Green Amplified Spontaneous Emission;** Han, Yamin; Sun, Chen; Bai, Lubing; Zuo, Zongyan; Xu, Man; Yu, Mengna; An, Xiang; Wei, Chuanxin; Lin, Jinyi; Wang, Ning; Ou, Changjin; Xie, Linghai; Ding, Xuehua; Cabanillas-Gonzalez, Juan; Huang, Wei; *Phys. Status Solidi RRL* 2020, **14**, 1900493; <https://doi.org/10.1002/pssr.201900493>
- 3. Highly Efficient Singlet Oxygen Generators Based on Ruthenium Phthalocyanines: Synthesis, Characterization and in vitro Evaluation for Photodynamic Therapy;** Ferreira, Joana T.; Pina, Joao; Ribeiro, Carlos A. F.; Fernandes, Rosa; Tome, Joao P. C.; Salome Rodriguez-Morgade, M.; Torres, Tomas; *Chem.Eur.J.* 2020, **26**, 1789–1799; <https://doi.org/10.1002/chem.201903546>
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- 5. Silicon-Based Photonic Architectures from Hierarchically Porous Carbon Opals;** Karime Gil-Herrera, Luz; Gallego-Gomez, Francisco; Torres-Pardo, Almudena; Gonzalez-Calbet, Jose M.; Palomares, Francisco J.; Blanco, Alvaro; Juarez, Beatriz H.; Lopez, Cefe; *Part. Part. Syst. Charact.* 2020, **37**, 1900396; <https://doi.org/10.1002/ppsc.201900396>
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- 9. The emergence of one-dimensional channels in marginal-angle twisted bilayer graphene;** Walet, Niels R.; Guinea, Francisco; *2D Mater.* **7** (2020) 015023; <https://doi.org/10.1088/2053-1583/ab57f8>
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Christine; Cernicharo, Jose; Martin-Gago, Jose A.; *Nat Astron* **4**, 97–105 (2020).; <https://doi.org/10.1038/s41550-019-0899-4>

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**14. The History of Nanoscience and Nanotechnology: From Chemical-Physical Applications to Nanomedicine;** Bayda, Samer; Adeel, Muhammad; Tuccinardi, Tiziano; Cordani, Marco; Rizzolio, Flavio; *Molecules* **2020**, 25(1), 112; <https://doi.org/10.3390/molecules25010112>

**15. Toxicity of superparamagnetic iron oxide nanoparticles to the microalga *Chlamydomonas reinhardtii*;** Hurtado-Gallego, Jara; Pulido-Reyes, Gerardo; Gonzalez-Pleiter, Miguel; Salas, Gorka; Leganes, Francisco; Rosal, Roberto; Fernandez-Pinas, Francisca; *Chemosphere* **238** (2020) 124562; <https://doi.org/10.1016/j.chemosphere.2019.124562>

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**19. Actin reorganization at the centrosomal area and the immune synapse regulates polarized secretory traffic of multivesicular bodies in T lymphocytes;** Bello-Gamboa, Ana; Velasco, Marta; Moreno, Solange;

Herranz, Gonzalo; Ilie, Roxana; Huetos, Silvia; Davila, Sergio; Sancheza, Alicia; Bernardino De La Serna, Jorge; Calvo, Victor; Izquierdo, Manuel; *Journal of Extracellular Vesicles*, **9**:1, 1759926; <https://doi.org/10.1080/20013078.2020.1759926>

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- 29. The Bilayer Collective Properties Govern the Interaction of an HIV-1 Antibody with the Viral Membrane;** Carravilla, Pablo; Darre, Leonardo; Oar-Arteta, Itziar R.; Vesga, Arturo G.; Rujas, Eduarne; de las Heras-Martinez, Gloria; Domene, Carmen; Nieva, Jose L.; Requejo-Isidro, Jose; *Biophys. J.* **118**, 44–56.; <https://doi.org/10.1016/j.bpj.2019.11.005>
- 30. Efficient Optimization of Electron/Oxygen Pathway by Constructing Ceria/Hydroxide Interface for Highly Active Oxygen Evolution Reaction;** Xia, Jiale; Zhao, Hongyang; Huang, Bolong; Xu, Lingling; Luo, Meng; Wang, Jianwei; Luo, Feng; Du, Yaping; Yan, Chun-Hua; *Adv. Funct. Mater.* **2020**, *30*, 1908367; <https://doi.org/10.1002/adfm.201908367>
- 31. Amphiphilic phthalocyanines in polymeric micelles: a supramolecular approach toward efficient third-generation photosensitizers;** Setaro, Francesca; Wennink, Jos W. H.; Makinen, Petri, I.; Holappa, Lari; Trohopoulos, Panagiotis N.; Yla-Herttuala, Seppo; van Nostrum, Cornelus F.; de la Escosura, Andres; Torres, Tomas; *J. Mater. Chem. B*, **2020**, *8*, 282–289; <https://doi.org/10.1039/c9tb02014d>
- 32. An extraordinary chiral exchange-bias phenomenon: engineering the sign of the bias field in orthogonal bilayers by a magnetically switchable response mechanism;** Bollero, Alberto; Neu, Volker; Baltz, Vincent; Serantes, David; Cunado, Jose Luis F.; Pedrosa, Javier; Palmero, Ester M.; Seifert, Marietta; Dieny, Bernard; del Real, Rafael P.; Vazquez, Manuel; Chubykalo-Fesenko, Oksana; Camarero, Julio; *Nanoscale*, **2020**, *12*, 1155–1163; <https://doi.org/10.1039/c9nr08852k>
- 33. Nanoscale View of Amyloid Photodynamic Damage;** Bondia, Patricia; Torra, Joaquim; Tone, Caterina M.; Sawazaki, Taka; del Valle, Adrin; Sot, Begona; Nonell, Santi; Kanai, Motomu; Sohma, Youhei; Flors, Cristina; *J. Am. Chem. Soc.* **2020**, *142*, *2*, 922–930; <https://doi.org/10.1021/jacs.9b10632>
- 34. Mutant p53 induces SIRT3/MnSOD axis to moderate ROS production in melanoma cells;** Torrens-Mas, Margalida; Cordani, Marco; Mullappilly, Nidula; Pacchiana, Raffaella; Riganti, Chiara; Palmieri, Marta; Pons, Daniel G.; Roca, Pilar; Oliver, Jordi; Donadelli, Massimo; *Archives of Biochemistry and Biophysics* **679** (2020) 108219; <https://doi.org/10.1016/j.abb.2019.108219>
- 35. Colossal heating efficiency via eddy currents in amorphous microwires with nearly zero magnetostriction;** Morales, Irene; Archilla, Diego; de la Presa, Patricia; Hernando, Antonio; Marin, Pilar; *Sci Rep* **10**, 602 (2020).; <https://doi.org/10.1038/s41598-020-57434-8>
- 36. Steric Poly(diarylfluorene-co-benzothiadiazole) for Efficient Amplified Spontaneous Emission and Polymer Light-Emitting Diodes: Benefit from Preventing Interchain Aggregation and Polaron Formation;** Bai, Lubing; Sun, Chen; Han, Yamin; Wei, Chuanxin; An, Xiang; Sun, Lili; Sun, Ning; Yu, Mengna; Zhang, Kangning; Lin, Jinyi; Xu, Man; Xie, Linghai; Ling, Haifeng; Cabanillas-Gonzalez, Juan; Song, Ling; Hao, Xiaotao; Huang, Wei; *Adv. Optical Mater.* **2020**, *8*, 1901616; <https://doi.org/10.1002/adom.201901616>
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**72. Expanding the Subporphyrine Chromophore by Conjugation of Phenylene and Vinylene Substituents: Rainbow SubPzs;** Caballero, Esmeralda; Guzman, David; Torres, Tomas; Salome Rodriguez-Morgade,



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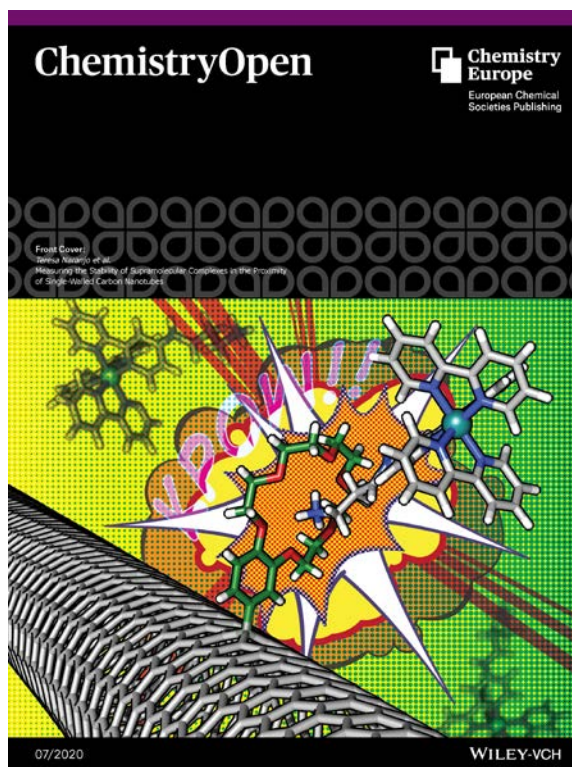
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## 2. Patents

Title	Inventors	Applicants	Publication number	Earliest priority	Publication date	Earliest publication
Substrates for culturing and stimulating cells	Ballerini Laura [It] Calaresu Ivo [It] Camarero De Diego Julio [Es] González Pérez María Teresa [Es] Hernández Rueda Jaime Javier [Es] Miranda Soriano Rodolfo [Es] Pérez García Lucas [Es] Rauti Rossana [It] Rodríguez Fernández María Isabel [Es] Scaini Denis [It]	Fund IMDEA Nanociencia [Es] Scuola Int Superiore Di Studi Avanzati [It]	WO2021069604A1	2019-10-10	2021-04-15	2021-04-14
Colorimetric detector	Gamonal Ruiz-Crespo Arturo [Es] Piñeiro Lucía [Es] Resines Urién Esther [Es] Sánchez Costa José [Es]	Fund IMDEA Nanociencia [Es]	EP3789761A1	2019-09-05	2021-03-10	2021-03-10
Anticancer compositions containing mirna mimics and uses thereof	Latorre Lozano Alfonso [Es] Milán Rois Paula [Es] Somoza Calatrava Álvaro [Es]	Fund IMDEA Nanociencia [Es]	EP3626820A1	2018-09-20	2020-03-25	2020-03-25
Method for detection of marked structures	Acebrón Rodicio María [Es] Arias González de la Aleja José Ricardo [Es] Hernández Juárez Beatriz [Es] Iborra Rodríguez Francisco José [Es] Rodríguez Rodríguez Héctor [Es]	Consejo Superior Investigacion [Es] Fund IMDEA Nanociencia [Es] Univ Madrid Autonoma [Es]	WO2020021154A1	2018-07-27	2020-01-30	2020-01-30
Method for detection of an analyte	Aires Trapote Antonio [Es] Artés Ibañez Emilio José [Es] Cabrera Carrasco David [Es] Camarero de Diego Julio [Es] López Cortajarena Aitziber [Es] Terán Garcinuño Francisco José [Es]	Fund IMDEA Nanociencia [Es]	WO2019092131A1	2017-11-10	2019-05-16	2019-05-16
Ferrite type materials and process for the production thereof	Camarero de Diego Julio [Es] Deledda Stefano [No] Guzik Matylda [No] Real Alberto Bollerero [Es] Rodríguez Javier Rial [Es]	Fund IMDEA Nanociencia [Es] Inst Energiteknik [No]	WO2018211121A1	2017-05-18	2018-11-22	2018-11-22
Systems and methods for obtaining unique identifiers and measuring displacements by sensing and analyzing spatial magnetic field variations	Bollerero Real Alberto [Es] Camarero de Diego Julio [Es] Pedrosa Ruiz Francisco Javier [Es]	Fund IMDEA Nanociencia [Es] Fund IMDEA Nanociencia [Es]	EP3246722A1 EP3246722B1	2016-05-20	2017-11-22 2019-01-09	2017-11-22
Polymeric composites with functional surfaces	Hernández Rueda Jaime [Es] Navarro Baena Iván [Es] Rodríguez Fernández Isabel [Es] Viela Bovio Felipe [Es]	Fund IMDEA Nanociencia [Es]	WO2017167909A1	2016-03-31	2017-10-05	2017-10-05





Title	Inventors	Applicants	Publication number	Earliest priority	Publication date	Earliest publication
Functionalised magnetic nanoparticle	Aires Trapote Antonio [Es] Couleaud Pierre [Es] Latorre Lozano Alfonso [Es] López Cortajarena Aitziber [Es] Ocampo García Sandra [Es] Somoza Calatrava Álvaro [Es]	Fund IMDEA Nanociencia [Es]	W02016150521A1	2015-03-26	2016-09-29	2016-09-29
Graphene covalently modified (machine-translation by google translate, not legally binding)	Bernardo Gavito Ramón [Es] Black Morcoima Andrés Calleja Mitja Fabián [Es] Garnica Alonso Manuela [Es] Granados Ruiz Daniel [Es] Leret Garcia Sofía [Es] Lopez Vazquez de Parga Amadeo [Es] Miranda Soriano Rodolfo [Es] Navarro Ocana Juan Jesús [Es] Perez Alvarez Emilio [Es] Stradi Daniele [It]	Fund IMDEA Nanociencia [Es] Univ Madrid Autonoma [Es]	ES2578997A1 ES2578997B2	2015-02-02	2016-08-03 2017-01-27	2016-08-03
Detection and treatment of gnaq mutant uveal melanoma cells with gold nanoparticles	Latorre Lozano Alfonso [Es] Posch Christian [Us] Somoza Calatrava Alvaro [Es] Urda Susana Ortiz [Us]	Fund IMDEA Nanociencia [Es] Univ California [Us]	W02015116502A1	2014-01-31	2015-08-06	2015-08-06
Functionalized metal nanoparticles and uses thereof for detecting nucleic acids	Latorre Lozano Alfonso [Es] Ortiz Urda Susana [Us] Posch Christian [Us] Somoza Calatrava Álvaro [Es]	Fund IMDEA Nanociencia [Es] Univ California [Us]	W02015114127A1	2014-01-31	2015-08-06	2015-08-05
Preparation of corrugated and porous graphene from cof for use as supercapacitors (machine-translation by google translate, not legally binding)	Abellan Saez Gonzalo [Es] Coronado Miralles Eugenio [Es] Mas Balleste Rubén [Es] Ribera Hermano Antonio Luis [Es] Rodriguez San Miguel David [Es] Zamora Abanades Félix [Es]	Uni de València [Es] Univ Madrid Autonoma Fund IMDEA Nanociencia Univ de València [Es] Univ Madrid Autonoma [Es]	ES2538604A1 ES2538604B1	2013-11-22	2015-06-22 2016-04-20	2015-05-28
Method for the synthesis of covalent organic frameworks	de la Peña Ruigómez Alejandro [Es] Mas-Ballesté Rubén [Es] Rodríguez San Miguel David [Es] Segura Castedo José Luis [Es] Zamora Abanades Félix Juan [Es]	Fund IMDEA Nanociencia [Es] Univ Autónoma de Madrid [Es] Univ Madrid Complutense [Es]	W02015015035A1	2013-07-31	2015-02-05	2015-02-04
Graphene dried powder and method for its preparation	Azani Mohammad-Reza [Es] Carcelén Valero Verónica [Es] Castellano Doblaré Manuel [Es] Mas-Ballesté Rubén [Es] Miranda Soriano Rodolfo [Es] Zamora Abanades Félix Juan [Es]	Abengoa Res SI [Es] Fund IMDEA Nanociencia [Es] Univ Autónoma de Madrid [Es]	W02015014862A1	2013-07-30	2015-02-05	2015-02-04
Modified solid support for the synthesis of oligonucleotides	Latorre Lozano Alfonso [Es] Somoza Calatrava Alvaro [Es]	Fund IMDEA Nanociencia [Es] Fund IMDEA Nanociencia [Es]	US2016075680A1	2013-04-30	2016-03-17	2014-11-05
Position-sensitive photodetector, method for obtaining same and method for measuring the response from the photodetector	Cabanillas Gonzalez Juan [Es] Campoy Quiles Mariano [Es]	Consejo Superior Investigacion [Es] Fund IMDEA Nanociencia [Es]	EP2650939A1	2010-12-10	2013-10-16	2013-10-16
Position-sensitive photodetector, method for obtaining same and method for measuring the response from the photodetector	Cabanillas Gonzalez Juan [Es] Campoy Quiles Mariano [Es]	Consejo Superior Investigacion Fund IMDEA Nanociencia [Es]	ES2384766A1 ES2384766B1	2010-12-10	2012-07-12 2013-05-22	2012-06-14

### 3. Congresses

**33**  
events  
24 on line

**141**  
contributions

**15 invited lectures**  
and **116 regular**  
contributions,  
56 oral and 60 as posters

17/01/2020

III Simposio Unidad de Excelencia de Química, Universidad de Granada

Hybrid nanoscopy of amyloids: from materials to biomedicine  
C. Flors

27/01/2020

International Conference on Molecular-Scale Charge and Thermal Transport (MSCTT), Engelberg, Switzerland

Electric and thermoelectric properties of conjugated oligomers at the single molecule level

Edmund Leary

31/01/2020

NALS2020, International Conference of Nanomaterials Applied to Life Sciences, Madrid, Spain

Nanostructured Biomaterials as Cell Instructive & Bactericidal Surfaces for Regenerative Medicine

Isabel Rodriguez

23/02/2020

TMS 2020 Annual Meeting & Exhibition San Diego, California, USA

Mn-based permanent magnets: from thin film micromagnets to bulk magnets obtained by hot-pressing of gas-atomized powder

A. Bollero

03/05/2020

Virtual 13th European School on Molecular Nanoscience (ESMoNa-2020)

Bottom-up Synthesis of (Chiral) Nanographenes  
Nazario Martín

01/07/2020

XAS Journal Club

Electronic and Structure Configurations of Earth-Abundant Water Splitting Catalysts and Spin Crossover Complexes

Dooshaye Moonshiram

16/07/2020

Nanophotonics of 2D materials. DIPC Donostia International Physics Center. Online

Flat bands and electronic structure in stacks of two dimensional systems\*

Francisco Guinea

31/07/2020

Soft Matter meets ultrafast spectroscopy (SMUS 2020). Heidelberg. Online

Imaging and controlling electron molecular dynamics: towards attochemistry

F. Martín



31/08/2020

2020 CMD and GEFES Joint Meeting CMD2020GEFES

From rare earth-free permanent magnet filament by solution casting and extrusion to 3D-printed magnets

A. Bollero

13/09/2020

6th International Fall School on Organic Electronics (IFSOE-2020)

Dual Emission: Classes, Mechanisms and Conditions

J. Gierschner

01/11/2020

Advanced Photon Source Review Committee, Argonne National Laboratory, IL

Elucidating the Ultrafast dynamics and Structural Conformations of Earth-Abundant Solar Fuel Catalysts for Artificial Photosynthesis

Dooshaye Moonshiram

09/11/2020

International Conference on Emerging Trends in Computational and Materials Chemistry Research - ICCMCR-20

Fluorescence Quenching vs. Enhancement in Organic Materials

J. Gierschner

18/11/2020

ESpinRed

Spin-Orbit-Related Phenomena at Graphene/Ferromagnetic interface

Paolo Perna

11/12/2020

I Congreso ACEM-AEBE: Biotecnología y Nanotecnología

Nanostructured Biomaterials as Cell Instructive & Bactericidal Surfaces

Isabel Rodriguez

15/12/2020

CRC / TRR 270 HoMMage Colloquia. Technische Universität Darmstadt / Universität Duisburg-Essen

Advances in the fabrication of rare earth-free permanent magnets by thermally controlled additive manufacturing: case study of gas-atomized MnAlC alloy

E.M. Palmero



## 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



European Research Council  
Established by the European Commission

#### 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

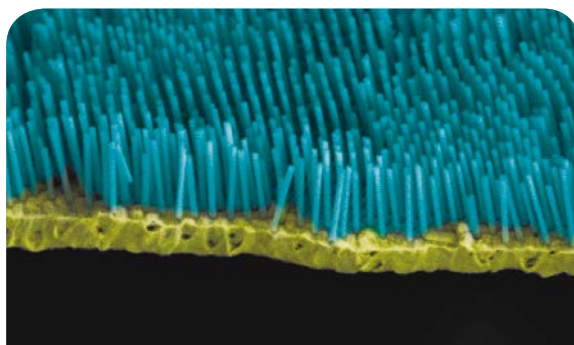
##### PINT

**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-SC5-2018-2019-2020

Grant Agreement number: 101003914

From 2021 to 2025

Coordinated by IMDEA Nanociencia

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

### 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/>

### ByAXON



#### Towards an active bypass for neural reconnection

H2020-FETOPEN-2016-2017

Grant Agreement number: 737116

From 2017 to 2020

Coordinated by IMDEA Nanociencia

Principal Investigators: [Dr. Rodolfo Miranda](#) and [Dr. Teresa González](#)

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

### A-LEAF



#### Towards An Artificial Leaf

H2020-FETPROACT-2016-2017

Grant Agreement number: 732840

From 2017 to 2020

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

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

### 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/>

### 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](#)

## 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](#)

#### GRAPHENECORE 2

Graphene Flagship Core Project 2  
H2020-SGA-FET-GRAPHENE-2017  
Grant Agreement number: 785219  
From 2018 to 2020  
Principal Investigator: [Dr. Francisco Guinea](#)

## ISO-G-Scope



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

### 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 Perez](#)

## 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/#tabsName:overview>

## OTHER INTERNATIONAL PROGRAMMES

### DEFROST



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

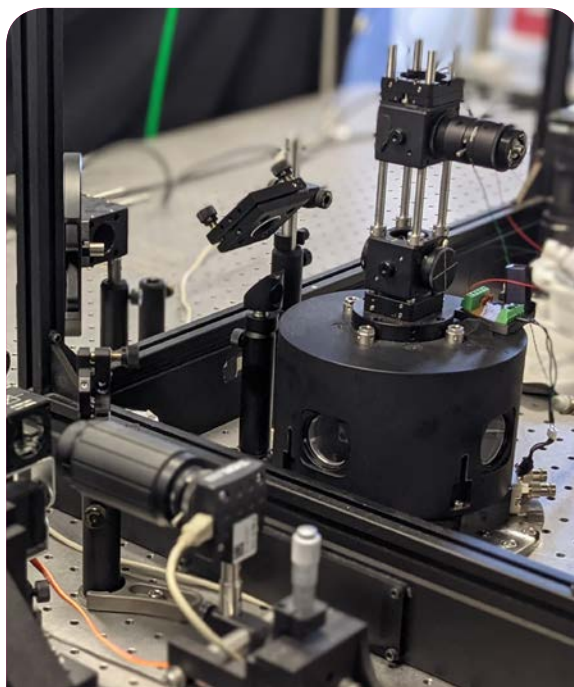
Funding: Office of Naval Research (United States)  
From 2019 to 2021  
Principal Investigator: [Dr. Daniel Granados](#)

### 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



### Plan Estatal de Investigación Científica, Técnica y de Innovación 2017-2020. Ministerio de Ciencia, Innovación y Universidades

#### 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. Alvaro Somoza**

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

### 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.

### Proyectos de I+D de generación de conocimiento

#### Call 2018

#### MICRUNC

#### Microscopia de super-resolución con fluoroforos 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](#)

### Call 2017

### BPMDUHDMRM

#### Bits de nanoestructuras magnéticas por nanolitografía de ADN para memorias magnéticas de alta densidad

Ref.: MAT2017-89868-P

From 2018 to 2020

Principal Investigator: [Dr. Feng Luo](#)

### 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](#)

### SwipH

#### Metallofarmacos como conmutadores sensibles al pH para su uso en nanomedicina

Ref.: CTQ2017-84932-P

From 2018 to 2020

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

### IMAN

#### Novel interfaces between molecules and nanomaterials

Ref.: CTQ2017-86060-P

From 2018 to 2020

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

## Equipamiento científico

### Spin-ARPEIS

#### Sistema de fotoemisión resuelta en ángulo con polarización en espín

Ref.: EQC2019-006304-P

From 2019 to 2020

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

## Acciones de Dinamización “Redes de Investigación” 2018

#### 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 2019

## OPINA

**Optimización en los Procesos de preparación y gestión de iniciativas europeas en IMDEA Nanociencia**

Ref.: ECT2019-000615

From 2019-2020

Principal Investigator: [Dr. M.J. Villa](#) (Projects, Communication and Research Support Offices)**SUBPROGRAMA ESTATAL DE I+D+I ORIENTADA A LOS RETOS DE LA SOCIEDAD**

## Proyectos I+D+i «Retos Investigación»

## 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-óxido 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 Canovas](#)

## pi-CONJUNANO

**Diseño en superficies y propiedades fisico-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](#)

## Call 2018

## SMS-QUITE

**Espintronica 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 Wanne-macher](#)

#### 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 Parga](#)

#### TOPTWEEZ

##### **Medida de temperatura en medios fisiológicos mediante pinzas ópticas**

Ref.: RTI2018-101939-B-I00

From 2019 to 2021

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

Call 2017

#### NanoSmart

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

Ref.: SAF2017-87305-R

From 2018 to 2020

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

#### 3D-MAGNETOH

##### **Impresión 3D de imanes basados en mn para configurar un nuevo horizonte en energía y transporte**

Ref.: MAT2017-89960-R

From 2018 to 2020

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

#### NANOLICO

##### **Nanomateriales funcionales para la verificación de predicciones in silico de nanotermometría e hipertermia magnética**

Ref.: MAT2017-85617-R

From 2018 to 2020

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

#### DETECTA

##### **Desarrollo de detectores para futuras misiones espaciales en el mm/sub-mm y fir basados en materiales superconductores o de baja dimensionalidad**

Ref.: ESP2017-86582-C4-3-R

From 2018 to 2019

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

#### BiSURE

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

Ref.: DPI2017-90058-R

From 2018 to 2020

Principal Investigators: [Dr. M. Isabel Rodríguez Fernández](#) 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 J. Terán](#)

Coordinated by IMDEA Nanociencia

#### AMYLIGHT

##### **Desarrollo de estrategias fototerapéuticas para la amiloidosis mediante visión nanoscopica 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](#)

### Call 2019

##### **Designing rational schemes for solar fuel and methane oxidizing catalysts**

Ayudas del ERC “Starting Grants” (StG)

Ref.: EIN2019-103399

From 2019 to 2020

Principal Investigator: [Dr. Dooshaye Moonshiram](#)

**Preparación de la propuesta: ANACONDA**

Acciones en Tecnologías Futuras y Emergentes (FET)

Ref.: EIN2019-103305

From 2019 to 2020

 Principal Investigator: **Dr. Isabel Rodríguez Fernández**
**Nanociencia aplicada al desarrollo de imanes permanentes libres de tierras raras mediante tecnologías sostenible**

Ayudas del ERC “Advanced Grants” (AdG)

Ref.: EIN2019-103506

From 2019 to 2020

 Principal Investigator: **Dr. Alberto Bollero**
**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, Communication and Research Support Offices)

**Other projects**
**AECC Semilla**

**Ideas Semilla 2019**

 Principal Investigator: **Dr. Ana Espinosa de los Monteros**
**Nanoseek**

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

FONDO SUPERA COVID-19

2020-2021

 Principal Investigator: **Dr. Rodolfo Miranda** (UAM)

(col. IMDEA Nanociencia and Hospital Ramón y Cajal)

**4.3. Regional programmes**
**Programas de Actividades de I+ D entre grupos de investigación de la Comunidad de Madrid**
**SINERGIAS 2018**
**FULMATEN**

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

Coordinator: IMDEA Nanociencia

From 2019 to 2021

 Principal Investigator: **Dr. Fernando Martin**



## QUIMTRONIC

### Química disruptiva en la nanoescala par electrónica y flexibles

Coordinator: Universidad Complutense de Madrid

From 2019 to 2021

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

## CONVOCATORIA TECNOLOGÍAS 2018

### NMAT2D



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

Coordinator: IMDEA Nanociencia

From 2019 to 2022

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

### NanomagCOST



### 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

### 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

### 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

### 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](#)

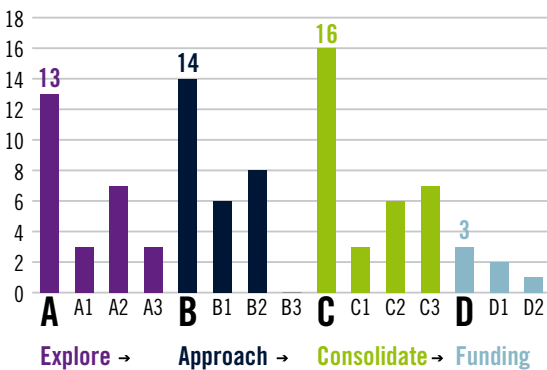
## 4.4. Industrial projects

The Strategic Industrial Partnership Office (SIPO) 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 strategically important institutional partners.

A system has been introduced to manage all the contacts (69 companies accumulated in 2019-20) and monitor the maturity of the relationships using a proprietary set of metrics Partnership Readiness Level (PRL). 35 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 are now part of the IMDEA Nanociencia eco-system, with 19% of these contacts coming from outside of Spain.

### Partnerships Readiness Level (PRL) proprietary to IMDEA Nano

Industrial Opportunities (09/2019)



Company: Höganäs (Sweden)



### ECNanoManga

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

From 2018 to 2021

Principal Investigator: **Dr. Alberto Bollero**

Company: Nanocore Aps (Denmark)

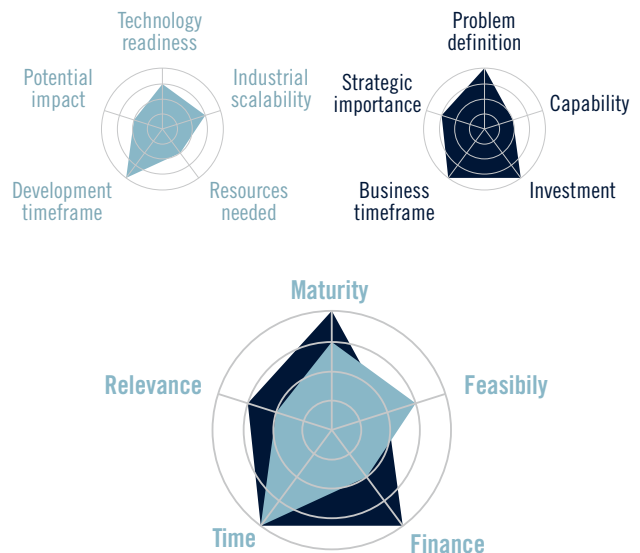


### TSUNAMI

From 2010-2023

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

### Nanotechnology Roadmapping





## 4.5. Fellowships

### 4.5.1. International



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

##### 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. Jose 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 Martin](#)

##### 2DSPIN

##### *2D magnetic materials for molecular SPINtronics*

### 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 2015 [Dr. Jose Sánchez Costa](#)

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

Call 2018 [Dr. Jose Ignacio Urgel](#) (Incorporación)

Call 2017 [Dr. Lucía Piñeiro](#) (Formación)

##### *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](#)

Call 2016 [Isabel Ortiz](#)

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

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 Milián](#), [Daniel Moreno](#), [Tomás Nicolás](#)

Call 2016 [Patricia Bondía](#)

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

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

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

Call 2017 [Dr. Manuela Garnica](#), [Dr. Christin David](#)

**Ayudas para la Contratación de Doctorados Industriales**

Call 2020 [Alodia Farmacéutica S.L. \(IND2020/IND-17517\)](#). [Arturo González](#)

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

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

Total 28:

2017 (16 Predocs); 2018 (8 Predocs & 1 PostDoc); 2019 (3 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 14:

2017 (3 Ayu. & 2 Tec.); 2018 (3 Ayud.); 2019 (4 Ayu. & 2 Tec.)

### 4.5.4. Others Programmes



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

Call 2019 [Dr. Ignacio Colomer](#)

Call 2018 [Dr. Manuela Garnica](#)

**Programa de Becas de Doctorado InPhINIT**

Call 2020 [Alonso Jose Campos](#)

Call 2018 [Raman Prajapati](#)



**Ayudas Predoctorales en Oncología (APRO)**

Call 2019 [Dr. Catarina Coutinho](#)





## 5. Training

### 1. Seminars

**01 SEMINAR** FRONTIERS IN NEUROMORPHIC COMPUTING

15<sup>th</sup> 2020  
**jun**

San Diego 09:30  
Madrid 18:30

Javier del Valle Ph.D.

Quantum Materials  
UC San Diego

UNIVERSITÉ DE GENÈVE

**02 SEMINAR** FRONTIERS IN NANO CHEMISTRY ON SURFACES

10<sup>th</sup> 2020  
**dec**

San Diego 09:30  
Madrid 18:30

Steven De Feyter Ph.D.

Hosted through zoom

SDF

14/01/2020

IMDEA Nanociencia

Multifunctional approaches based on thermal nanotherapies: heat generation, therapeutic efficiency and limitations

Dr. Ana Espinosa

**3<sup>rd</sup> 2020**  
**feb**

12:00pm

IMDEA Nanociencia  
Conference Hall

Carbon and DNA nanostructures:  
from controlled assembly  
to functional devices

Prof. Matteo Palma  
Queen Mary University of London, UK

**28<sup>th</sup> 2020**  
**jan**

11:00am

IMDEA Nanociencia  
Conference Hall

Nanoparticles:  
from safe-by-design  
to toxic-by-design

Dr. Stefaan Soenen  
Katholieke Universiteit, Leuven, Belgium

**18<sup>th</sup> 2020**  
**feb**

12:00pm

IMDEA Nanociencia  
Conference Hall

Science at Alba:  
overview and perspectives

Prof. Klaus Attenkofer  
ALBA Scientific Director, Barcelona



**From the First designed cell-penetrating transporters to carts: basic science and clinical applications** **18th feb 2020**

12:00pm  
IMDEA Nanociencia Conference Hall

Prof. Paul Wender  
Department of Chemical and Systems Biology, Stanford University, USA

**Intracellular temperature measurements using anisotropy-based nanothermometers** **17th nov 2020**

12:00

Sebastian Thomson  
IMDEA Nanociencia

Online seminar

**Electronic structure engineering by extended organic nanoporous networks** **28th feb 2020**

12:00pm  
IMDEA Nanociencia Conference Hall

Dr. Jorge Lobo-Checa  
Instituto de Ciencia de Materiales de Aragón (ICMA) and Departamento de Física de la Materia Condensada, Universidad de Zaragoza, Spain

**e-Learning Training for MSCA Individual Fellowships** **7-9-10th july 2020**

10:00am  
ONLINE

Dr. Juliane Sauer  
Oxygeneum

workshop

**InLight in a nanotip: near field spectroscopic techniques based on scanning tunneling microscope** **24th nov 2020**

12:00

Dr. Natalia Martín  
IMDEA Nanociencia

Online seminar

## 2. Conferences and Courses

**32** courses and conferences  
**16** international institutions  
20 of them online



→ For further details see Annex page 160

## 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 programmes 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

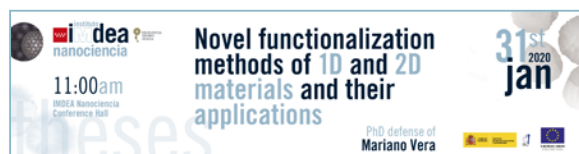
31/01/2020

Mariano Vera

*Novel Functionalization Methods of 1D and 2D Materials and Their Applications*

Supervisor: Emilio Pérez

Universidad Autónoma de Madrid



14/02/2020

Miguel Ángel Revuelta Maza

*Synthesis, Aggregation and Photophysical Studies of A2B2 Phthalocyanines: Novel Archetypes for Anticancer and Antimicrobial Photodynamic Therapy*

Supervisor(s): Tomás Torres and Gema de la Torre Ponce

Universidad Autónoma de Madrid

21/02/2020

Alfonso Pérez Sanchez

*Síntesis y Propiedades de sistemas multivalentes basados en nanoformas de carbono*

Supervisor(s): Nazario Martín

Universidad Complutense de Madrid

12/03/2020

Yansheng Liu

*The applications of CVD grown graphene in surface-enhanced Raman scattering and Förster resonance energy transfer*

Supervisor(s): Feng Luo and Reinhold Wannemacher

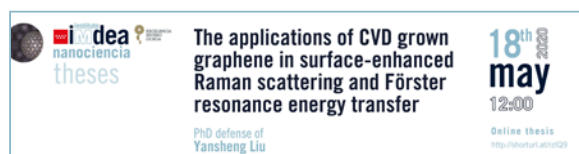
18/05/2020

Yansheng Liu

*The applications of CVD grown graphene in surface-enhanced Raman scattering and Förster resonance energy transfer*

Supervisor: Feng Luo

Universidad Autónoma de Madrid



02/06/2020

Peng Han

*Charge carrier dynamics in hybrid semiconductors*

Supervisor(s): Enrique Cánovas y Mischa Bonn

Universidad Complutense de Madrid

17/07/2020

Julia Villalva

*Chemistry of nanomaterials inside out; mechanically interlocked, endohedral and covalent derivatives of SWNTs and 2D materials*

Supervisor: Emilio Pérez

Universidad Autónoma de Madrid

18/09/2020

Adrián del Valle

*Simultaneous Fluorescence and Atomic Force Microscopy to study mechanically-induced bacterial death in real time*

Supervisor: Cristina Flors

Universidad Autónoma de Madrid



22/09/2020

Estefanía Fernández

*Novel switchable hybrid materials for applications as sensors at the molecular level*

Supervisor: José Sánchez Costa

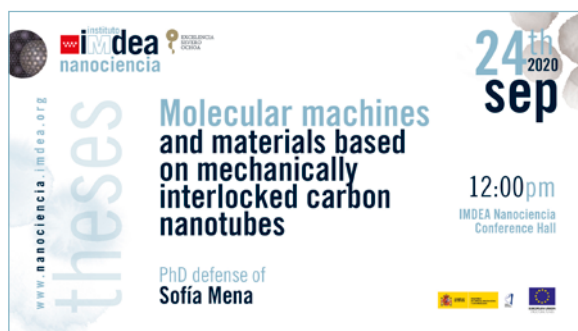
Universidad Complutense de Madrid



**24/09/2020****Sofía Mena***Molecular Machines and Materials based on Mechanically Interlocked Carbon Nanotubes*

Supervisor: Emilio Pérez

Universidad Autónoma de Madrid

**25/09/2020****Kateryna Lemishko***Mechano-chemistry and dynamics of biological and synthetic systems*

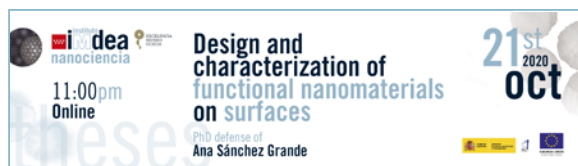
Supervisor: Borja Ibarra

Universidad Autónoma de Madrid

**21/10/2020****Ana Sánchez Grande***Design and characterization of functional nanomaterials on surfaces*

Supervisor: David Écija

Universidad Autónoma de Madrid

**05/11/2020****Chen Sun***Optical and morphology properties of supramolecularly controlled conjugated polymers*

Supervisor(s): Juan Cabanillas

**06/11/2020****Ana Carrasco***Tethered Iridium(III) Cyclopentadienyl Half-Sandwich Complexes for Biological Applications*

Supervisor: Ana Pizarro

Universidad Autónoma de Madrid

**16/11/2020****Ahmad Sousaraei***Photophysical Properties of Luminescent Metal-Organic Frameworks for Gas Sensing*

Supervisor(s): Juan Cabanillas

**27/11/2020****Javier Urieta Mora***Design and synthesis of organic p-type semiconductors: Toward efficient Perovskite Solar Cells"*

Supervisor(s): Nazario Martín

Universidad Complutense de Madrid

**10/12/2020****Veronica Almeida Marrero***Synthesis, Supramolecular Organization and Biological Properties of Phthalocyanine-Sialic Acid Biohybrid Photosensitizers*

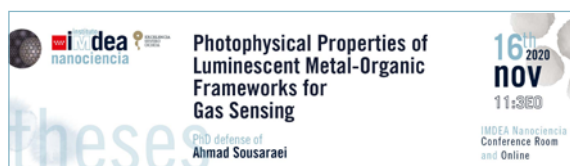
Supervisor(s): Tomás Torres and Andres de la Escosura Navazo

Universidad Autónoma de Madrid

**16/11/2020****Ahmad Sousaraei***Photophysical Properties of Luminescent Metal-Organic Frameworks for Gas Sensing*

Supervisor: Juan Cabanillas

Universidad Autónoma de Madrid



## 6. Internationalization

### 1. Scientific Conference (co)-organized



Organised by: **instituto imdea nanociencia** and **EXCELENCIA SEVERO OCHOA**

# NALS 2020

Madrid · Spain

## 2nd International Conference on Nanomaterials Applied to Life Sciences

29<sup>th</sup>-31<sup>st</sup> January 2020

Logos: UAM Universidad Autónoma de Madrid, excelencia UAM CSIC, Comunitat de Madrid



**instituto imdea nanociencia** and **EXCELENCIA SEVERO OCHOA**

# 10<sup>th</sup> early stage researchers workshop in nanoscience

16<sup>th</sup> dec 2020

Logos: Spanish Government, European Union



Four social media posts from the Nanociencia Instagram account, each featuring a poster from the NALS 2020 conference. Each post includes a URL to the poster, a title, a brief description, and a 'Poster' label. The posts are numbered 14, 11, 14, and 13.

- 14 [http://nanociencia.imdea.org/images/workshops/10esrw/10ESRW\\_Poster\\_Area2\\_11.pdf](http://nanociencia.imdea.org/images/workshops/10esrw/10ESRW_Poster_Area2_11.pdf)

**Poster**  
Novel oligoethers-nanoparticle assemblies for osteoelectronic applications  
Marta-Cristina Alvarez-Benito, María Pérez-Cerdá and José L. Rodríguez
- 11 [http://nanociencia.imdea.org/images/workshops/10esrw/10ESRW\\_Poster\\_Area2\\_11.pdf](http://nanociencia.imdea.org/images/workshops/10esrw/10ESRW_Poster_Area2_11.pdf)

**Poster**  
Spin-state dependent electrical conductivity in single-wall carbon nanotubes  
Alejo Rodríguez, María Victoria Muñoz-González, Gabriela Rodríguez-Lorenzo, Tomás M. Pineda, and Benjamin Binnert
- 14 [http://nanociencia.imdea.org/images/workshops/10esrw/10ESRW\\_Poster\\_Area3\\_15.pdf](http://nanociencia.imdea.org/images/workshops/10esrw/10ESRW_Poster_Area3_15.pdf)

**Poster**  
On chip magnetic spectroscopy of a molecular spin qubit at mK temperature  
V. Anzures, M. Salas, J. Guzmán, M. C. de Oya, S. Martínez-Losa del Real, M. J. Martínez-Frutos, & Gómez, A. Chikhi, D. Suarez, S. Higgins, T. Cantelmo, and F. Luis
- 13 [http://nanociencia.imdea.org/images/workshops/10esrw/10ESRW\\_Poster\\_Area4\\_14.pdf](http://nanociencia.imdea.org/images/workshops/10esrw/10ESRW_Poster_Area4_14.pdf)

**Poster**  
Biorthogonal Photocatalytic Activation of Platinum Prodrugs  
José Guzmán-Fernández, María L. Cisneros and José Salas



## 2. 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)

## 3. 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.



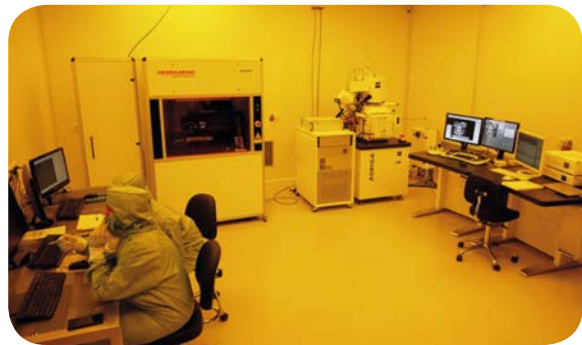
## 7. High-quality research infrastructure

### 1. Center for nanofabrication



N° registro: 363

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 Microscopy, Wire Bonder, Diamond Scriber, Probe Station and Parameter analyzer. This section is also equipped with an encapsulation room and a large wet chemistry room.

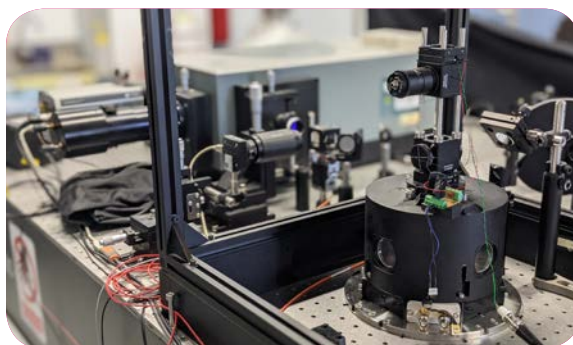
The Centre for Nanofabrication provides the researches and users within the Cantoblanco campus of the UAM and in the framework of the Campus of Excellence project, with an efficient access to the necessary nanofabrication resources to be internationally competitive. Since IMDEA Nanociencia is an institute 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.

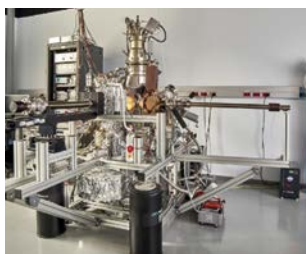
One of the priorities of the infrastructure development was to ensure equipment and laboratory space was available to develop our new **Research programme in Quantum Devices** (P5). This is highlighted by the following scientific infrastructures:

- A new spin-ARPES (spin & Angle Resolved Photoemission Spectroscopy) system, unique in Spain, has been installed in December 2020. It will permit the characterisation of the electronic structure of spin polarised bands in surfaces and interfaces.
- New UHV e-beam evaporator installed in the centre of nanofabrication as part of our framework collaboration with UAM. Partially funded by a National Infrastructure Grant.
- 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 unique non-contact AFM/STM laboratory in UHV (installed in 2019) is fully operative at cryogenic temperatures since June 2020 as part of Dr. Ecija's ERC Project (P2) (CoG -ELECANO).

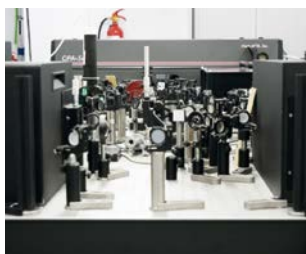


- Cell Culture and Microbiology Unit expansion to now host two laboratories working under BioSafety Level 2 is operative since beginning 2020. Enabling in-house projects and encouraging transversal transfer of knowledge between programmes (P2, P3, P6) potentiating external collaborations.
- Laboratory for PhotoHyperthermia AECC seed funding is assisting in the set-up of this unique facility (P3, P4 A. Espinosa).

### 3. RedLab – Network of laboratories of the Regional Government of Madrid



**278**  
**Laboratory of Surfaces**  
Contact: F. Calleja



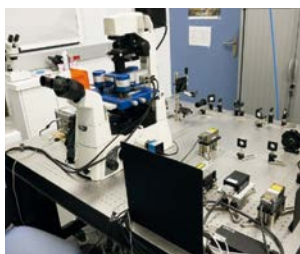
**279**  
**Laboratory of Advanced Optical Characterization**  
Contact: J. Cabanillas



**280**  
**Laboratory of Femtosecond Spectroscopy**  
Contact: L. Lürer



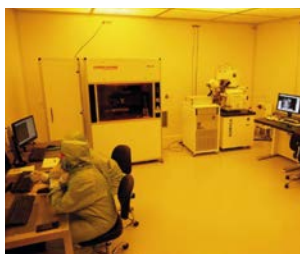
**282**  
**Laboratory of Nanomagnetism**  
Contact: P. Perna



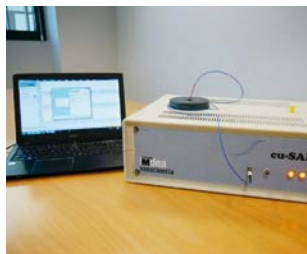
**293**  
**Laboratory of Atomic Force Microscopy**  
Contact: C. Flors



**349**  
**Laboratory of Cell Cultures**  
Contact: A. Pizarro



**363**  
**Laboratory of Nanofabrication**  
Contact: D. Granados



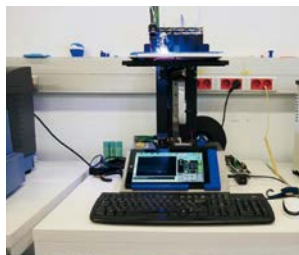
**398**  
**Laboratory of the Instrumentation Service**  
Contact: F. Terán



**435**  
**Laboratory of Nanomaterials Characterization**  
Contact: Y. Luengo



**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



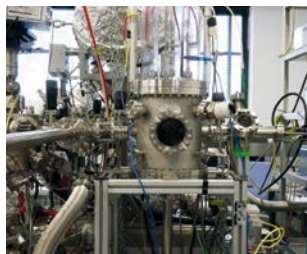
**438**  
**Laboratory of Biomolecules Preparation for Nanotechnological Applications**  
Contact: B. Sot



**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

## 8. Awards and honours

### Premio Nacional de Investigación 2020 Nazario Martín



### Premios de Investigación de la Comunidad de Madrid "Miguel Catalán" 2019 José Luis López Carrascosa



### Embajador del Madrid Convention Bureau 2020 Rodolfo Miranda





**Prof. Tomás Torres**

03/02/2020  
**Fellow de Chemistry Europe, 2019**  
Chemistry Europe/Wiley

01/07/2020  
**Premio Lourenço-Madinaveitia, Portugal, 2020**  
Sociedade Portuguesa de Química



**Dr. Borja Ibarra**

**Investigador de NanoLSI**  
Instituto de Ciencias de la Vida Nano de la Universidad de Kanazawa  
**Prof. Honorífico**  
Universidad Complutense de Madrid



**Prof. Fernando Martín**

01/09/2020  
**Doctor Honoris Causa**  
Stockholm University, Sweden



for his oral presentation:

**ELDICO Prize for an Outstanding Oral Presentation**  
Ahmad Sousarei  
01/06/2020

**Best Twitter Poster, 10th Early Stage Researchers Workshop in Nanoscience**  
Ahmad Sousarei  
16/12/2020

**Best Poster 8th Multifrequency AFM Conference**  
Adrián del Valle  
30/10/2020



**Best Poster Presentation Award at the CEMAG Young Symposium Meeting**  
Carla Muñoz  
19/11/2020

**Best Oral Communication Award at the CEMAG Young Symposium Meeting**  
Elena Sanz de Diego  
19/11/2020

**Best Poster JEMS 2020**  
Adrián Gudin  
07/12/2020

## 9. Communication and Outreach

### 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.



### Virtual Lab tours

Part of *Nanociencia para todos*, allows continuity with our visits and keeps Institute commitment to “open-doors”.



### IMDEA Nanociencia on Instagram!

Easier access for students to videos/virtual tours.

Virtual exhibition of journal covers #IMDEANanoPics





# 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.



ILUMINAMOS EL FRAGMENTO DE CD CON LA LINTERNA



ILUMINAMOS EL VASO POR DETRÁS

OBSERVA CÓMO LA LUZ HA CAMBIADO DE COLOR AZUL A ANARANJADO



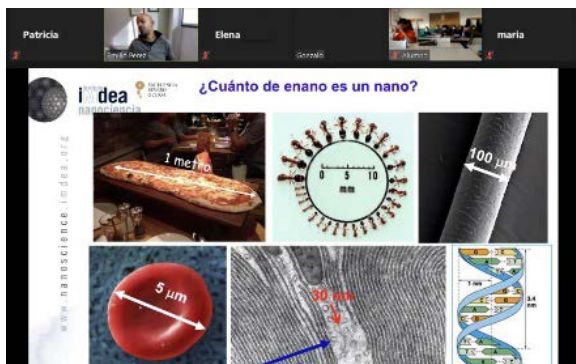
OBSERVAMOS LA ÚLTIMA MUESTRA CON NUESTRA LUPA

## XX edición de la Semana de la Ciencia y la Innovación de Madrid

November 10th

“Acércate a la Nanociencia: lo pequeño es diferente”

70 Students from IES Emilio Castelar (Carabanchel and Colegio San Gabriel (Madrid) ) assisted to the on-line lecture by Dr. E. Pérez.



## Noche Europea de los Investigadores de Madrid en IMDEA Nanociencia



## grandes científicas en la "gran pantalla"

"Great women" researchers on the "big screen"



undécima **noche europea** de los **investigadores** madrid



Investigadores de los **7 institutos IMDEA** hablarán de grandes investigadoras que han sido o podrían ser protagonistas en la gran pantalla.

**Investigadores invitados:**

- Abraham Esteve (*Agua*)
- Ana Ramírez de Molina (*Alimentación*)
- Marta Liras (*Energía*)
- Mónica Echeverry y Eugenia Nieto (*Materiales*)
- Natalia Martín y Sofía Oliveira (*Nanociencia*)
- Arturo Azcorra (*Networks*)
- Elena Gutiérrez y Silvia Sebastián (*Software*)

**Con la colaboración especial de:**

- Manuel Carro (*Software*)



¡Podrás preguntar a los investigadores a través de los perfiles de los Institutos IMDEA en Youtube, Twitter y Facebook!



Actividad emitida en directo desde la Residencia de Estudiantes (sin público en la sala) a través de [www.imdea.org](http://www.imdea.org) y [www.edaddeplata.org](http://www.edaddeplata.org)







# Día internacional de la mujer y la niña en la ciencia



## Programa

10:00 - 10:30 Bienvenida en el salón de actos - Ana Pizarro, 30 minutos.

10:30 - 11:00 Kahoot! *Mujeres que hacen historia* en el salón de actos - Álvaro Somoza, 30 minutos

11:00 - 12:00 *Visita a los laboratorios* - Sala Hinarejos, Adriana Arnáiz; S21, Zulay Pardo; B35, Cristina Navío; 109, Isabel Rodríguez; 157, Begoña Sot; B11, Cristina Flors; 121 Emilio Pérez; S03, Manuela Garnica; 137/151, Álvaro Somoza; B49, Mariela Menghini



Students (4º ESO) from IES La Senda (Getafe) and Colegio Mater Salvatoris (Madrid) participated.

## IMDEA Nanociencia Repository



Open Science commitment - all IMDEA publications and data will be freely available at the Institutional repository.

This aligns the Institute with the Open Access policies of Horizon Europe and the Spanish and Regional Government funding agency requirements.



Home

Advanced search

- » Author
- » Funding
- » Title
- » Communities & Collections

My account

- » Log in
- » New registry

Services

- » Autoarchive guide
- » Open access policies
- » Licenses
- » Help - FAQs

### Welcome to IMDEA Nanociencia Repository

The institutional Repository of IMDEA Nanociencia is the digital archive that collects the scientific production of the institute, with the aim of preserving and disseminating research results in open access.

Q



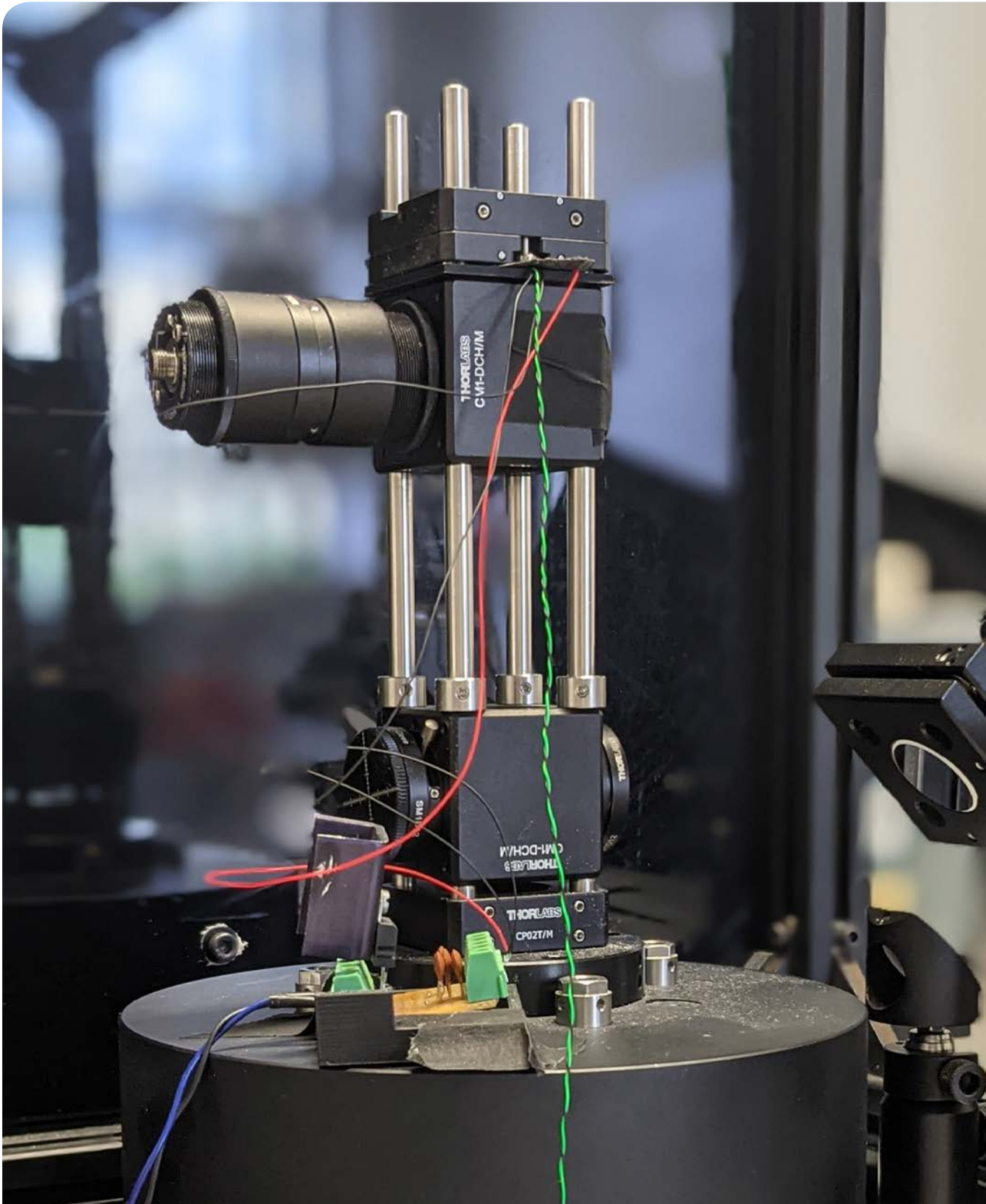
» Recent submissions



» Institutional documents



» Research programmes



# 4

## projects offices

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1. Competitive Projects Office (CPO) [140]
2. Research Support Office (RSO) [144]
3. Gender Equality Plan 2020 [146]



## About

### S0 Programme Strengthening Research Support

As well as support for our Research Programmes, an important part of the Severo Ochoa project was to reinforce and strengthen the support provided for our researchers. The strengthening of the Competitive Projects Office –provides help in identifying and submission of proposals to important international funding sources (EU, and others). The Dissemination and Communication Office has been formalised, allowing the expansion of our communication networks to aid the dissemination of the scientific results from the Institute. The opening of the Research Support Office allows us to centralise support for staff and students and has the short-term goal of achieving the Human Resource Research of Excellence Award. Finally, the creation of the Strategic International Partnerships Office provides our researchers with unique support in creating collaborative links to both Industry and World-renowned research institutes.



# 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

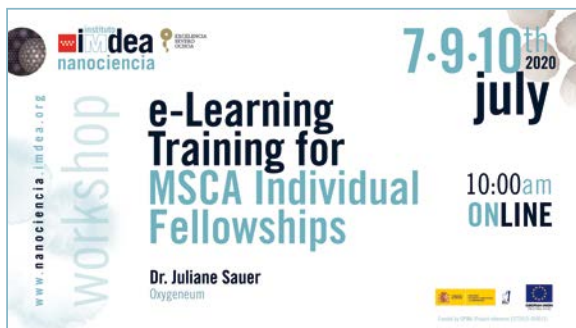




## FOCUS 2: TALENT ATTRACTION

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

*IMDEA Nanociencia Postdoctoral Training Programme in Nanoscience (FP)*

H2020-MSCA-COFUND-2020

Awarded February 2021

## FOCUS 3: ASSISTANCE

- Active Funding identification
- Proposal Revision Service
- Support service to find partners
- Projects Report Service
- Innovation-based proposal (FET-PROACTIVE, FET Launchpad, EIT KICs)

### NanoCoG

*Nanotechnology for Electrocardiography*

H2020-FETOPEN-2018-2020 CSA-LSP

Submitted: Proposal number 101034993

### Nanostripe

*Adaptative nanostripes for upgrading current technologies*

H2020-FETOPEN-2018-2020 CSA-LSP

Submitted: Proposal number 101034978

## FOCUS 4: SUSTAINABILITY

Europa Redes y Gestores - Europa Centros Tecnológicos

### OPINA

**Optimizacion en Los Procesos de preparacion y gestion de iniciativas europeas en IMDEA Nanociencia**

Ref.: ECT2019-000615

From 2019-2020

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

### 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)







### FOCUS 3

Development of the IMDEA Nano Welcome Pack to boost HR internal communication

#### Actions:

Development of the Welcome Pack and the Employee Handbook



#### Welcome to IMDEA Nanociencia

Thanks for choosing our institute and welcome to IMDEA Nanociencia!

We hope that during your stay at IMDEA, whether it is a short-term stay or a long-term one, you will achieve the professional and personal development you are aiming for as you begin this new stage.

This handbook intends to provide guidance and information on the working culture at IMDEA, as well as the rights and obligations of employees. For further information on the rights and obligations as an employee of the centre, please refer to the internal regulations or to the regulations applicable to each case (Workers' Statute, Clauses in the Employment Contract, State Collective Agreement for University Education and Research Centres)

#### Code of conduct

IMDEA Nanociencia endorses the principles and recommendations of the European Charter for Researchers and Code of Conduct for the Recruitment of Researchers, our policies and protocols are therefore adapted to the recommendations of these documents.

The staff of the Institute must also observe the recommendations of the C&C in order to perform their work with the highest standards of excellence and professionalism.

#### Getting to know us

### FOCUS 4

Researchers Career Development support.

#### Actions:

Training courses on Career & Professional Development  
Development of Personal Career and Development Plan, Appraisal & Self Assessment tool



## instituto imdea nanociencia Training courses

www.nanociencia.imdea.org

17<sup>th</sup> dec 2020

# Professional development planning for researchers

10:00-13:00  
Online

workshop

# Gender Equality Plan 2020



Women in Nanoscience session in NALS 2020



Outreach activities on the Int. Day of Women & Girls in Science



Incorporating gender training in our programmes



HR EXCELLENCE IN RESEARCH

Work-life balance policies included in the Welcome Pack



Collection of resources on gender in R+D for researchers



Incorporation of gender analysis in competitive project proposals



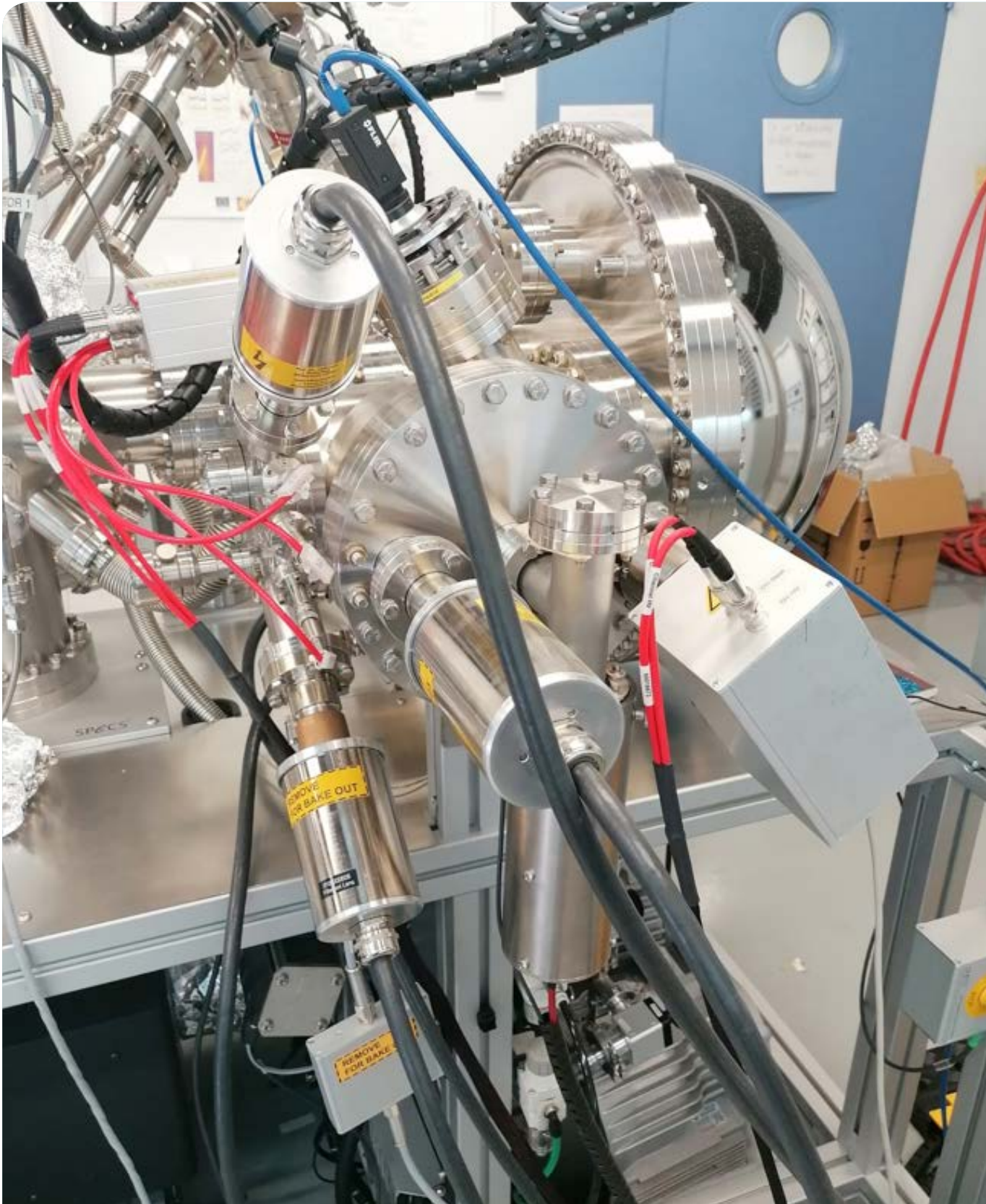
## Article Gender Equality Indicators for Research and Innovation from a Responsible Perspective: The Case of Spain

Paula Otero-Hermida\* and Mónica García-Meliso  
INGENIO (CSIC-UIV), Universitat Politècnica de València, Camino de Vera s/n, Valencia 46102, Spain;  
mgarciam@upv.es  
\* Correspondence: paototh@upvnet.upv.es; Tel.: +34-697-203-070

Selection of indicators for monitoring implementation of the Gender/Equality? Plan



RSO staff being trained in gender



# 5

## research focus

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1. Detection of SARS-CoV-2 [149]
2. NoCanther [150]
3. Applications of nanotechnology for metrology [152]

nano  
**20**  
annual  
report



# 1. Detection of SARS-CoV-2

## Fighting against COVID-19

The COVID-19 pandemic triggered a strong reaction in the scientific community. This led to the urgent development of vaccines, pharmaceuticals and equipment to protect against infection, relieve symptoms or cure the disease. In parallel, the development of technologies to counter the spread of disease and save lives, such as diagnostic, analytics and information tools. Testing was demonstrated as crucial for detecting and minimising the spread of the virus, as well as for monitoring the condition of patients. The IMDEA Nanociencia contribution to this unexpected global fight was in the field of developing detectors, in particular, gold nanoparticle-based sensors for the detection of SARS-CoV-2.

## Vision

The diagnostic system proposed at IMDEA Nanociencia was aimed at merging the two main approaches for detecting the SARS-CoV-2: the RT-qPCR (quantitative Reverse Transcription PCR) and the antigen tests. The PCR tests are focused on a precise and specific detection of the viral RNA after enzymatic amplification, but require expensive equipment, specialized personnel and hours to get the results. On the contrary, in a few minutes the antigen test detect the virus by targeting the proteins on the virus's surface by using lateral flow assays. The IMDEA Nanociencia detector merges both systems to obtain precision, as the PCR, with the ease of use and low-cost like the antigen test.

## Implementation

IMDEA Nanociencia opted for a quick adaptation of its current bio-sensing technology - based on gold nanoparticles (AuNPs) covered with functionalized oligonucleotides - to detect the viral RNA of SARS-CoV-2. This approach required the modification of AuNPs with DNA sequences complementary to the sequence of the viral RNA. The interaction between these nucleic acids induces the aggregation of AuNPs, which can be detected by the naked eye, which simplifies its use and readout. The system can be adapted to detect different genes of the virus, including those with single point mutations. In parallel, to increase the sensor's sensitivity, amplification systems were implemented to allow the detection of viral RNA obtained from infected cells or patients. Also, readout systems using lateral flow assays and optoelectronic emitters and detectors were developed. Additionally, IMDEA Nanociencia collaborates in a project of the Centro de Biología Molecular Severo Ochoa (CBMSO / CSIC) to detect the virus in the air in the areas of particular prevalence, such as Madrid hospitals.

## Funding and partnership

The research effort was supported thanks to several projects financed by ad hoc funds deployed during the initial months of the pandemic. The Instituto de Salud Carlos III (ISCIII) launched the FONDO – COVID19, and Banco de Santander with CRUE Universidades Española (Conferencia de Rectores de las Universidades españolas) and CSIC (Consejo Superior de Investigaciones Científicas) had the initiative of the Fondo Supera Covid-19. IMDEA Nanociencia was involved in three projects, two of the ISCIII grants:

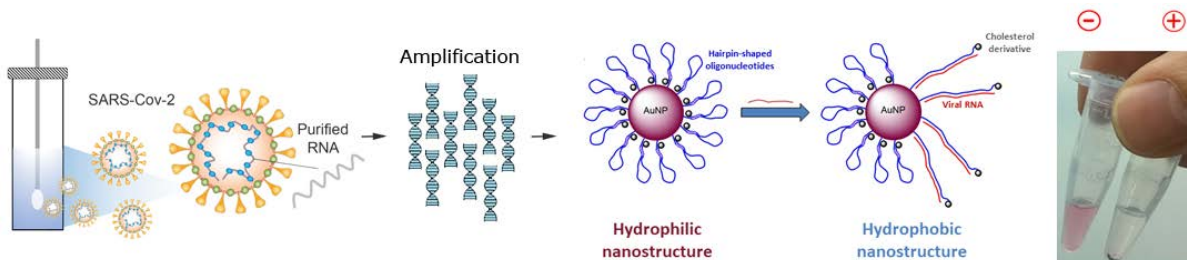
**Transmisión de SARS-CoV2 por el aire: detección en hospitales y tecnologías innovadoras**, coordinated by CBMSO / CSIC and with the participation of the University Hospitals (La Paz, Puerta de Hierro y Severo Ochoa), the Centro Nacional de Microbiología (ISCIII) and the Instituto de Salud Global de Barcelona, as collaborating entities

**Desarrollo de sensores colorimétricos basados en nanopartículas de oro para la detección del SARS-CoV2** – Coordinated by IMDEA Nanociencia with Instituto Ramón y Cajal de Investigación Sanitaria (YRYCIS) and Synthelia Organics S.L. as collaborating entities.

and a third one of Santander-CRUE-CSIC:

**Nanotech-based PCR-free SARS-CoV-2 quantitative detection kit (NANOSEEK)** – Coordinated by UAM (Universidad Autónoma de Madrid) and with the participation of the Hospital Universitario Ramón y Cajal

Several partnerships grew in the framework of these projects thanks to the participation of Hospitals and companies. The interdisciplinary of the R&D teams is a constant in the projects, a demonstration of the determination of the science community in supporting any solution from its expertise to mitigate the pandemic. At the time of the edition of this annual report the research continues, but the huge advance achieved by IMDEA Nanociencia in these detection techniques has changed forever our ability to deal with the future bio-threats that will come with emerging viruses.



## 2. NoCanTher

**A long-haul multidisciplinary project reaches a clinical study**

### Background

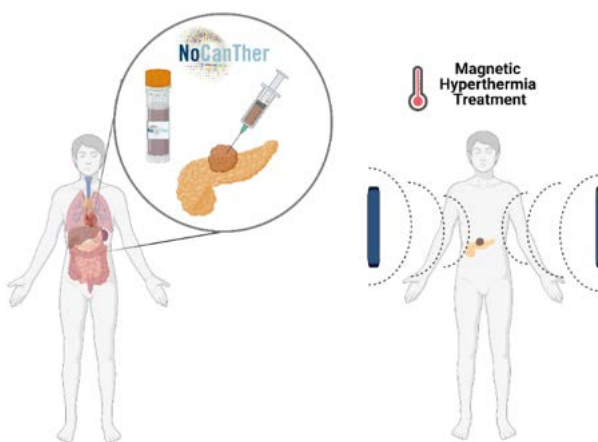
Nanomedicine has emerged as a potential therapy for pancreatic cancer, a disease with a 5-year survival rate as low as 5%. Novel approaches are therefore required to increase the efficacy of chemotherapy. The NoCanTher project was launched in 2016 to test the use of magnetic nanoparticles in treating locally advanced pancreatic cancer, and is coordinated by the Institute. The project builds on the work from the Multifun project (2011–2015, PI: Prof Rodolfo Miranda), scientifically coordinated by IMDEA Nanociencia, which led the early development of the nanoparticles used as the basis of the NoCanTher project.



## Milestone Clinical Study

The NoCanTher project has entered its final phase with the start of a clinical study aimed at patients with unresectable, locally advanced pancreatic cancer that has not metastasized, for whom the only therapeutic alternative is palliative chemotherapy.

*This important milestone marks the culmination of over ten years' of scientific work. The study will be led from Spain and carried out at two sites Hospital Universitario de Fuenlabrada (Madrid) and -Vall d'Hebron Institute of Oncology (Barcelona). This novel approach will now be tested in patients with locally advanced pancreatic cancer.*



Magnetic nanoparticles are implanted in the tumor, followed by the application of an alternating magnetic field to enhance the therapeutic effect of the standard of care.

## Multidisciplinary Groups

The IMDEA team headed by Rodolfo Miranda and Álvaro Somoza, have implemented the experience of the preparation and scale-up of magnetic nanoparticles and importantly, the characterization of this type of nanomaterials. Important contributions from Fran Teran, Gorka Salas, Daniel Ortega supported by Ana Pizarro and the team at the cell-culture unit have brought together chemists, physicists and biologists together to achieve this unique success.

## Consortium:

Under the coordination of IMDEA Nanociencia, eleven national and international research centres are members of the NoCanTher – Nanomedicine upscaling for early clinical phases of multimodal cancer therapy – Consortium: BioKeralt Research Institute (Miñano, Spain), ImmuPharma (London, England), Chemicell (Berlin, Germany), University Hospital (Jena, Germany), Resonant Circuits (London, England), Vall d'Hebron Research Institute (VHIR) (Vall d'Hebron Barcelona Hospital Campus, Barcelona, Spain), Trinity College (Dublin, Ireland), Université Paris Diderot (Paris, France),

Vall d'Hebron Institute of Oncology (VHIO) (Vall d'Hebron Barcelona Hospital Campus, Barcelona, Spain), Hospital Universitario de Fuenlabrada (Madrid, Spain).

This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 685795.

For more information about the project, please visit: [www.nocanther-project.eu](http://www.nocanther-project.eu).

### 3. Applications of nanotechnology for metrology

#### Metrology

metrology is a science in continuous evolution, trying to improve the realization of fundamental magnitudes through precision measurements of various fundamental constants. An example of this is the realization of resistance through the quantum Hall effect. The revision of the SI in 2019 represents an historic change of paradigm for metrology, defining all the SI units in terms of fundamental constants of nature. The development of new experiments and devices is challenge in metrology and a clear opportunity for nanotechnology.

#### Vision

Nanotechnology is an enabler for metrology, with potential to make materials and devices to correlate physical observables to the fixed defining constants, paving the way for the realization of self-calibrating systems. The final goal is to achieve systems that can independently refer to the fundamental constants of nature with zero-chain traceability. In order to have a safe convergence with the metrology field, IMDEA Nanociencia signed in March 2020 an institutional agreement with the CEM (Centro Español de Metrología) and began to participate in the European Metrology Programme for Innovation and Research (EMPIR), co-funded by European Union's Horizon 2020 research and innovation programme and the EMPIR participating member states. Thanks to this framework, we can participate in addressing some of the metrology challenges proposed by the European Association of National Metrology Institutes (EURAMET). IMDEA Nanociencia and CEM have a common interest in working together towards a Spanish quantum resistance standard based on Graphene.



CEM CENTRO ESPAÑOL DE METROLOGÍA



EMPIR EURAMET



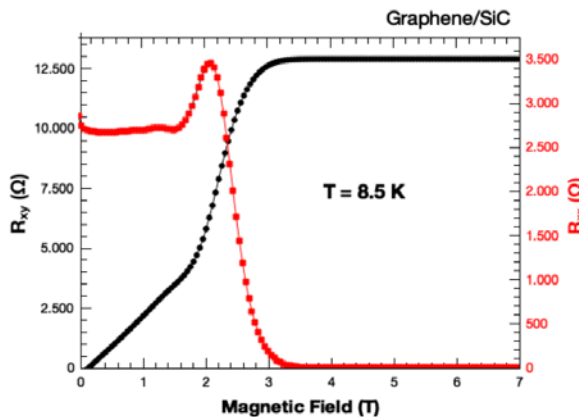
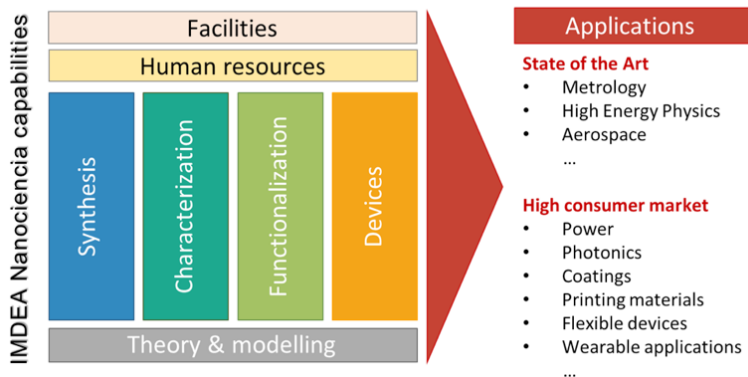


## Funding and partnership

IMDEA Nanociencia's heritage in the full value chain of 2D materials (graphene, MoS<sub>2</sub>...), combined with the know-how in superconductivity and its unique capabilities in micro/nano-manufacturing, made the Institute an excellent participant to apply in EMPIR consortiums. The relations with main European Metrology National Centres and industrial actors in Metrology were established and several projects were financed in the 2019/20 consortium calls:

1. **ISO-G-Scope** - Standardisation of structural and chemical properties of graphene;
2. **MEMQuD** - Memristive devices as Quantum Standard for Nanometrology;
3. **COMET** - Two dimensional lattices of covalent- and metal-organic frameworks for the Quantum Hall resistance standard.

### Value chain of 2D Materials (Graphene, MoS<sub>2</sub> ...)



The first measurement of Quantum Hall effect in graphene, performed at IMDEA

# 6

## annexes

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1. National and International Congresses [155]
2. Conferences and Courses [160]
3. Outreach activities [162]



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

**33 events**

24 on line

**161 contributions**

**15 invited lectures**

and **116 regular contributions,**

56 oral and 60 as posters

**15/01/2020**

**13th National Organic Chemistry Meeting (13ENQO), Universidade de Aveiro, Aveiro**  
*Subphthalocyanines: Singular aromatic non-planar molecules*

Oral contribution

T. Torres

**29/01/2020**

**NALS2020, International Conference of Nanomaterials Applied to Life Sciences, Madrid**

Oral contributions

*Biocompatibility studies of novel nanostructures electrodes for neural repair in spinal cord injury*

Ana Domínguez, Ankor González-Mayorga, Beatriz L. Rodilla, Ana Arché, Lucas Pérez, María

Teresa González, Elisa López, and María Concepción Serrano

*Nanotechnology-based neural interfaces*

M. T. González, B. L. Rodilla, A. Arché-Núñez, I. Calaresu, L. Enger, A. Vera, A. Domínguez, A. González-Mayorga, J. Hernández, C. Fernández-González, S. Ruiz-Gómez, I. Martínez, R. Guerrero, L. Pérez, J. Camarero, S. Flament, D. Scaini, I. Rodríguez, E. López-Dolado, M. C. Serrano, L. Méchin, L. Ballerini, R. Miranda

*Targeting the plasma membrane as a secondary target in photodynamic therapy for cancer cells*

Sebastian Thompson

*Tumour Vessel-on-a-chip for Nanomedicine Development*

Sergio Dávila, Jean Cacheux Isabel Rodriguez

*Role of the number of recognition ligands per particle on the sensitivity of a novel magnetic detection method of biomarkers*

E. Sanz-de Diego, C.C Vequi-Suplicy, A. Aires, J. Requejo-Isidro, A.L. Cortajarena and F.J. Teran

Poster contributions

*Hybrid systems for metal-based bio-orthogonal catalysis on carbon nanotubes*

Federica Battistin, Ana M. Pizarro

*Iridium(III) Anticancer Complexes for the Functionalization of Soft Nanoparticles*

Ana C. Carrasco, Adriana Arnaiz, Ivonne González-Gamboa, Carmen Yuste-Calvo, Flora Sánchez, Fernando Ponz and Ana M. Pizarro

*Magnetic detection of neural activity in spinal cord slices*

A.Vera, I. Martinez, R. Guerrero, I. Calaresu, J. Camarero, L. Ballerini, R. Miranda, M. T. Gonzalez, L. Perez

*Mechanobiological Control of Human Neural Stem Cells*

Miguel Esteban-Lucía, Judith Estengre Pérez, Silvia García-López, Jaime J Hernández, Mar-

ta P Pereira, Alberto Martínez-Serrano, Isabel Rodríguez

*Nanostructured electrodes for electrophysiological measurements*

Ana Arché-Núñez, Beatriz L. Rodilla, Julio Camarero, Rodolfo Miranda, Lucas Pérez, María Concepción Serrano and M. Teresa González

*Nanostructured electrodes for neural stimulation*

Beatriz L. Rodilla, Ana Arché-Núñez, Claudia Fernández-González, Sandra Ruiz-Gómez, Ana Domínguez-Bajo, Ankor González-Mayorga, Ivo Calaresu, Rossana Rauti, Denis Scaini, Julio Camarero, Rodolfo Miranda, Elisa López Dolado, M. Concepción Serrano, Laura Ballerini, Lucas Pérez, M. Teresa González

*Osmium(II) half-sandwich compounds with carboxylate groups for nanoparticle functionalization*

Sonia Infante-Tadeo, Abraha Habtemariam, and Ana M. Pizarro

*Rhodium and iridium half-sandwich complexes that report on activity status inside cells*

Arturo Villechenous Rojo, Ana C. Carrasco, Adrián Luguera and Ana M. Pizarro

*Synthetic micro-nano environments for controlling infection and cell implantation in prosthetics*

M. T. Alameda, M. R. Osorio, J. J. Hernández, C. Baumlin, J. Estengre-Pérez, S. García-López, M.P. Pereira, A. Martínez-Serrano, I. Rodríguez

*Ultra-low magnetic field sensing using AMR magnetometers based*

I. Martínez, A. Vera, R. Guerrero, L. Enger, L. Perez, J. Camarero, L. Mechin, R. Miranda, M. T. González

*Quantification of heat dose released by iron oxide nanoparticles inside breast cancer cells under near infrared irradiation*

Claudia Lozano Pedraza, Ana Espinosa, Francisco Sanz-Rodríguez and Francisco J. Teran

*Benefits of the Encapsulation of Ag<sub>2</sub>S-based and Iron Oxide Nanocrystals into Phospholipidic Micelles in their Magnetic Properties*

D. Gómez, D. Ruiz, A. Espinosa, C. Lozano, D. Ortega, D. Jaque, G. Salas, B. H. Juárez and F. J. Terán

*Janus gold-iron oxide nanohybrids for magnetically-guided photothermal therapy*

A. Espinosa, J. Reguera, A. Curcio, Á. Muñoz-Naval, J. Castillo, A. Van de Walle, L. M. Liz-Marzán and C. Wilhelm.

*Synthesis of iron oxide hybrid nanoparticles for magnetic hyperthermia applications over different tumour cell lines*

David García-Soriano, Paula Milán-Rois, Nuria Lafuente-Gómez, Cristina Navío, Álvaro Somoza, Gorka Salas

30/01/2020

**1st meeting of the European XFEL Spanish user community, Hamburg, Germany**

*Attosecond molecular dynamics with XFELs, a theoretical perspective*

Oral contribution

F. Martín

02/02/2020

**Single Molecule Biophysics, Les Houches, France**

*Five minutes in the life of a molecular shuttle*

Oral contribution

B. Ibarra

23/02/2020

**TMS 2020 Annual Meeting & Exhibition, San Diego**

*Development of tuned composites based on metallic particles for advanced 3D-printing by Fused Deposition Modeling*

Oral contributions

E.M. Palmero, D. Casaleiz, J. de Vicente, J. Hernández-Vicen, S. López-Vidal, E. Ramiro, and A. Bollero

*Understanding the role of particle size in the development of flexible permanent magnet-polymer filaments*

E.M. Palmero, D. Casaleiz, J. Rial, J. de Vicente, and A. Bollero

25/02/2020

**Innovaciones en las tecnologías cuánticas (InnoUAM Cuántica), Madrid, Spain**

*Lo que la Química Computacional espera de las tecnologías cuánticas*

Oral contribution

F. Martín

01/03/2020

**MAGNETOFON COST Meeting. Online**

*Ultrafast Light-Induced Nucleation of Skyrmion Lattices*

Oral contribution

Pablo Olleros-Rodríguez, Mara Strungaru, Sergiu Ruta, Paul Gavriloea, Roy Chantrell, Paolo Perna and Oksana Chubykalo-Fesenko

02/03/2020

**JICI - V Reunión de Jóvenes Investigadores en Coloides e Interfases. Online**

*Cation incorporation and leaching in Mn<sub>x</sub>Fe<sub>3-x</sub>O<sub>4</sub> nanoparticles and its influence on properties for biomedical applications*

Oral contribution

David García-Soriano, Rebeca Amaro, Nuria Lafuente-Gómez, Paula Milán-Rois, Álvaro Somoza, Cristina Navío, Fernando Herranz, Lucía Gutiérrez, Gorka Salas

03/03/2020

**#RSCPoster Online Poster Session RSC**

Tomás Nicolás

<https://twitter.com/tnicolasgarcia/status/1234842687179776000>

07/03/2020

**Atsuhiko Osuka on the occasion of his 65th birthday and formal retirement, Kyoto University, Kyoto.**

*Phthal- and Subphthalocyanines: Supramolecular Chemistry and Molecular Photovoltaics*

Oral contribution

T. Torres

01/04/2020

**Single-Molecule Sensors and NanoSystems International Conference 2020. Online**

*Molecular-based coordination polymer as reversible and precise acetonitrile electro-optical readout*

Oral contribution

J. S. Costa

04-05/04/2020

**Hackathonvirtual Madrid #VenceAlVirus**

*Sistema de diagnóstico de la enfermedad CoVid-19*

Oral communication

H. Guerrero

03/05/2020

**ESMoINa2020 13th European School on Molecular Nanoscience. Online**

*Hybrid Superconducting Nanowires Single-Photon Detectors*

Oral contribution

Cristina García-Pérez

04/05/2020

**EGU General Assembly 2020**

*MiniPINS - Miniature in situ sensor packages for Mars and Moon*

Oral contribution

H. Guerrero

30/05/2020

**65th Crystal Engineering and Emerging Materials Workshop of Ontario and Quebec, Canada. Online**

*Reversible Protonation of Porphyrinic MOF as the Working Principle for Colorimetric Sensor Tags for Biogenic Amines*

Oral contribution

Ahmad Sousarei\*, Juan Cabanillas-Gonzalez



18/06/2020

**Virtual Scanning Probe Microscopy****Workshop. Online**

*Transition from Yu-Shiba-Rusinov states to Kondo screening of a charged TCNQ molecule on a Nb STM tip*

Poster contribution

C.G. Ayani, F. Calleja, P. Casado, M. Garnica, A.L. Vázquez de Parga and R. Miranda

*Unveiling the radiative local density of optical states of a plasmonic nanocavity by STM*

A. Martín-Jiménez, A. I. Fernández-Domínguez, K. Lauwaet, D. Granados, R. Miranda, F. J. García-Vidal and R. Otero

*1H and 1T' MoTe2 islands on Graphene/Ir (111): Growth, Topography and Electronic Structure*

Poster contribution

P. Casado Aguilar, A. L. Vázquez de Parga, R. Miranda, M. Garnica

11/07/2020

**FENS 2020 Virtual Forum of Neuroscience.****Online**

*Mechanobiological Control of Human Neural Stem Cells*

Poster contribution

Miguel Esteban-Lucía, Judith Estengre Pérez, Silvia García-López, Jaime J Hernández, Marta P Pereira, Alberto Martínez-Serrano, Isabel Rodríguez

*Polymeric Composite Nanopillars to Interface Neurons and Synaptic Network Formation*

Poster contribution

Ivo Calaresu, Jaime Hernandez, Isabel Rodríguez, M. Teresa González, Denis Scaini and Laura Ballerini

27/08/2020

**The 2020 Around-the-Clock Around-the-Globe Magnetism Conference. Online**  
**3D magnetometry using XMCD-PEEM**

**microscopy**

Oral contribution

S. Ruiz-Gómez, L. Pérez, J. de la Figuera, A.

Quesada, M. Foerster, L. Aballe

31/08/2020

**2020 CMD and GEFES Joint Meeting****CMD2020GEFES. Online**

Oral contributions

*Ferrocene – Graphene Molecular Junctions for Light Photodetection*

Trasobares, Jorge ;C. de Lory, Marina ;Martín, Juan Carlos ;Gómez, Alicia ;Niño, Miguel Ángel ;Miranda, Rodolfo ;Granados, Daniel

*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, T.G. Woodcock, and A. Bollero

*Spin-Orbit Torque from the Introduction of Cu Interlayers in Pt/Cu/Co/Pt Nanolayered Structures for Spintronic Devices*

A. Alberto Anadon, R. Guerrero, J. A. Jover-Galtier, A. Gudín, J. M. Díez, P. Olleros-Rodríguez, R. Miranda, J. Camarero, and P. Perna

*Ultrafast Light-Induced Nucleation of Skyrmion Lattices*

Pablo Olleros-Rodríguez, Mara Strungaru, Sergiu Ruta, Paul Gavriloea, Roy Chantrell, Paolo Perna and Oksana Chubykalo-Fesenko

*Hybrid Superconducting Nanowires Single-Photon Detectors*

Cristina García-Pérez, Víctor Marzoa, Marina C. De Ory, María Acebrón, Julia García-Pérez, MaríaTeresa Magaz, Fernando J Urbanos, Alicia Gómez, Ramón Bernardo-Gavito, Daniel Granados.

*Unveiling the radiative local density of optical states of a plasmonic nanocavity by STM*

Roberto Otero, Alberto Martín-Jiménez, Antonio I. Fernández-Domínguez, Koen Lauwaet, Daniel Granados, Rodolfo Miranda, and Francisco J. García-Vidal.

*Pi-conjugated polymers and topology*

D. Ecija

*Optical characterization of few-layer MoS2 mechanical resonators*

Victor Marzoa, C. García-Pérez, M. Acebró, M. R. Osorio, R. Bernardo-Gavito, D. Granados

Poster contributions

*Correlation between microstructure and magnetic properties of core/shell nanoparticles: (Co-, Ni-) ferrite/(CoFe, NiFe)*

D. Casaleiz, M. Villanueva, E.M. Palmero, Y. Luengo, J. Camarero, A. Espinosa, G. Salas, and A. Bollero

*Reversible electro-optical readout of volatile acetonitrile molecules with a switchable 1D Fe-based coordination polymer*

Aysegül Develioglu, Esther Resines-Urien, Estefanía Fernández-Bartolme, Roberta Poloni, José Sánchez Costa, Enrique Burzurí.

*Spin-state dependent electrical conductivity in single-wall carbon nanotubes encapsulating spin crossover molecules.*

Aysegül Develioglu, Julia Villalva, Arturo Gamonal, Eduardo Rial, José Sánchez Costa, Emilio M. Pérez, Enrique Burzurí.

01/09/2020

**European School of Magnetism (ESM).****Online**

*Magnetic configuration of permalloy cylindrical nanowires with chemical barriers*

Poster contribution

Laura Alvaro Gomez

03/09/2020

**SBAN2020 3rd Spanish Conference on Biomedical Applications of Nanomaterials. Online**

Poster contributions

*Magnetic detection of neural activity in spinal cord slices*

A.Vera, I. Martinez, R. Guerrero, I. Calaresu, J.

Camarero, L. Ballerini, R. Miranda, M. T. Gonzalez, L. Perez

*Planar and sharp nanotechnology-based electrodes for neural electric measurements*

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

*The influence of cation incorporation and leaching in the properties of Mn-doped nanoparticles for biomedical applications.*

David García-Soriano, Paula Milán-Rois, Nuria Lafuente-Gómez, Rebeca Amaro, Cristina Navío, Fernando Herranz, Álvaro Somoza, Lucía Gutiérrez, Gorka Salas

*Topographical bioengineering for mesenchymal stem cell-control and bactericidal properties study*

M.T. Alameda, M.R. Osorio, J. Hernández, M.P. Pereira, A. Martínez-Serrano, I. Rodríguez

*Opto-magnetic nanostructures for application in nanothermometry and hyperthermia: interactions in the biological environment*

C. Zalbidea, D. Ruiz, D. García-Soriano, D. Gómez, F. J. Terán, G. Salas, B. H. Juárez, A. Espinosa

*Doxorubicin-loaded iron oxide nanoparticles for multimodal hyperthermia-based anticancer treatments*

N. Lafuente-Gómez, J. Castillo, Y. Luengo, A. Serrano, G. Salas, Á. Somoza and A. Espinosa.

*Structure and magnetic properties of multi-core iron oxide nanoparticles obtained by polyol process*

Á. Gallo-Cordova, H. Gavilán, A. Serrano, E. Mazarío, M. P. Morales and A. Espinosa.

**07/09/2020**

**AEBIN Photochemistry School. Online**

*Activatable fluorescent probes based on rhodium(III) and iridium(III) half sandwich*

Poster contribution

Arturo Villechenous Rojo, Ana M. Pizarro

**09/09/2020**

**1st Annual meeting of the European COST Action on Attosecond Chemistry (AttoChem). Online**

*Imaging electron molecular dynamics: towards attochemistry*

Oral contribution

F. Martín

**19/09/2020**

**ImagineNano2020. Online**

*Nano-scale temperature measurements using anisotropy-based nanothermometers for cancer theranostics*

Oral contribution

Sebastian Thompson

**24/09/2020**

**2020 Shijiazhuang International Biotechnology and Pharmaceutical R&D Cloud Summit, Shijiazhuang, China. Online**

*Phthalocyanines based photosensitizers for Photodynamic Therapy of cancer and atherosclerosis*

Oral contribution

T. Torres

**24/09/2020-09/10/2020**

**14th Europlanet Science Congress 2020**

*MiniPINS - Miniature in situ sensor packages for Mars and Moon*

Oral contribution

H. Guerrero

**13/10/2020**

**Faraday Discussion: Cooperative phenomena in framework materials. Online**

*A switchable iron-based coordination polymer toward reversible acetonitrile electro-optical readout*

Poster contribution

E. Resines-Urien, J. S. Costa

**28/10/2020**

**International Conference on LEEM-PEEM 2020. Online**

*Domain Wall dynamics in permalloy nanowires with ferromagnetic chemical barriers*

Poster contribution

S. Ruiz-Gómez, C. Fernández-González, Michael Foerster, Lucía Aballe, Juan de la Figuera, Adrián Quesada and Lucas Pérez

**30/10/2020**

**8th Multifrequency AFM conference. Online**

*Bacterial cell wall mechanical damage studied by simultaneous nanoindentation and fluorescence microscopy*

Poster contribution

Adrián Del Valle, Joaquim Torra, Patricia Bondía, Caterina M. Tone, Virginia Vadillo and Cristina Flors

**02/11/2020**

**MMM2020 Annual Conference on Magnetism and Magnetic Materials. Online**

*Ultrafast Light-Induced Nucleation of Skyrmion Lattices*

Oral contribution

Pablo Olleros-Rodríguez, Mara Strungaru, Sergiu Ruta, Paul Gavriloaia, Roy Chantrell, Paolo Perna and Oksana Chubykalo-Fesenko

**18/11/2020**

**4th Young Researchers in Magnetism. Online**

*Influence of the spatial distribution of Iron Oxide Nanocrystals into Phospholipid Capsules on their Magnetic Losses*

Oral contributions

D. Gómez, D. Ruiz, A. Espinosa, C. Lozano, D. Ortega, D. Jaque, G. Salas, B. H. Juárez and F. J. Terán

*Exploiting Nanomagnetism for Bio-markers Detection in Biological Fluids*

E. Sanz-de Diego, A. Aires, D. Cabrera, Niccolò Silvestri, E. J. Artés-Ibáñez, G. Pugliese, T. Pelegrino, A. L. Cortajarena, F. J. Teran



*Development of novel MnAlC-based permanent magnet composite materials by solution casting to obtain flexible filaments for 3D printing*

D. Casaleiz, E.M. Palmero, J. de Vicente, and A. Bollero

*Non-Equilibrium heating path for the light-induced nucleation of skyrmion lattices*

Pablo Olleros-Rodríguez, Mara Strungaru, Sergiu Ruta, Paul Gavriloea, Roy Chantrell, Paolo Perna and Oksana Chubykalo-Fesenko

*Rare earth-free MnAlC permanent magnets produced by hot pressing from  $\alpha$ -phase gas-atomized and milled powder*

C. Muñoz-Rodríguez, E.M. Palmero, J. Rial, L. Feng, T. Mix, T.G. Woodcock, and A. Bollero

*Scale-up of nanowires synthesis for the application in composite bonded magnets*

C. Fernández-González, J. C. Guzmán-Minguez, A. Guedeja-Marrón, E. García-Martín, M. Foerster, L. Aballe, A. Quesada, L. Pérez and S. Ruiz-Gómez

Poster contributions

*Magnetic detection of neural activity in spinal cord slices*

A.Vera, I. Martinez, R. Guerrero, I. Calaresu, J. Camarero, L. Ballerini, R. Miranda, M. T. Gonzalez, L. Perez

*Spin Orbit driven effects and Thermal Activation of Ferromagnet Intercalated Graphene-Heavy Metal Interfaces*

A. Gudín, J. M. Díez, P. Olleros-Rodríguez, A. Alberto Anadon, R. Guerrero, R. Miranda, J. Camarero, and P. Perna

**01/12/2020**

**JEMS2020 The Joint European Magnetic Symposia. Online**

Oral contributions

*Effect of the deposition temperature on the performance of AMR sensors based on*

*La<sub>2</sub>/3Sr1/3MnO<sub>3</sub> thin films*

L.G. Enger, S. Flament, I. N. Bhatti, B. Guillet, M. Lam Chok Sing, V. Pierron, S. Lebargy, M. T. Gonzalez, J. Camarero, R. Miranda, L. Méchin

*Non-Equilibrium heating path for the light-induced nucleation of skyrmion lattices*

Pablo Olleros-Rodríguez, Mara Strungaru, Sergiu Ruta, Paul Gavriloea, Roy Chantrell, Paolo Perna and Oksana Chubykalo-Fesenko

*Towards an active bypass for neural reconnection*

I. Martínez, A. Vera, R. Guerrero, I. Calaresu, L. Perez, J. Camarero, L. Ballerini, R. Miranda, M. T. González

*Ultra-low magnetic field AMR magnetometers study based on LSMO for biomedical applications*

A. Vera, I. Martinez, R. Guerrero, L.Enger, L. Perez, J. Camarero, V. Pierron, S. Lebargy, B. Guillet, M. Lam Chok Sing, S. Flament, L. Mechin, R. Miranda, M. T. Gonzalez

Poster contributions

*Collective magnetic behaviour of metallic nanowire arrays*

Claudia Fernandez-Gonzalez, Sandra Ruiz-Gomez, Adrián Gudín, José Manuel Díez, Julio Camarero and Lucas Perez

*Spin Orbit driven effects and Thermal Activation of Ferromagnet Intercalated Graphene-Heavy Metal Interfaces*

A. Gudín, J. M. Díez, P. Olleros-Rodríguez, A. Alberto Anadon, R. Guerrero, R. Miranda, J. Camarero, and P. Perna

**11/12/2020**

**11th World Biomaterials Congress WBC2020. Online**

*Flexible nanostructured electrodes as promising interfaces for neural cells and tissues: Effect of the topography*

Poster contribution

Ana Dominguez-Bajo, Ankor González-Mayorga,

Beatriz L. Rodilla, Ana Arché-Núñez, Rodolfo Miranda, Julio Camarero, Lucas Pérez, M. Teresa González, Elisa López-Dolado, María Concepción Serrano

*Nanotechnology-based neural interfaces for spinal cord reconnection*

Oral contribution

M. Teresa González, Beatriz L. Rodilla, Ivo Calaresu, Luiz Guilherme Enger, Arturo Vera, Ana Domínguez-Bajo, Ana Arché-Núñez, Ankor González-Mayorga, Jaime Hernández, Anja Meier, Sandra Ruiz-Gómez, Claudia Fernández-González, Isidoro Martínez, Rubén Guerrero, Victor Pierron, Sylvain Lebargy, Bruno Guillet, Marc Lam, Chok Sing, Olivier Rousseau, Sandeep Kumar Chaluvadi, Carmen Huck, Bernd Lecher, Lucas Pérez, Julio Camarero, Stéphane Flament, Denis Scaini, Isabel Rodríguez, Elisa López-Dolado, María Concepción Serrano, Laurence Méchin, Laura Ballerini, Rodolfo Miranda

**16/12/2020**

**10th Early Stage Researchers Workshop in Nanoscience. Online**

Oral contributions

*2H- and 1T'- MoTe<sub>2</sub> islands on Graphene/Ir(111): Growth, Topography and Electronic Structure*

P. Casado Aguilar, A. L. Vázquez de Parga, R. Miranda, M. Garnica

*3D-printing of MnAlC magnets: Influence of the particle size on the synthesis of MnAlC/polymer composites and magnetic flexible filaments for 3D-printing*

D. Casaleiz, E.M. Palmero, J. de Vicente, and A. Bollero

*Covalent post-synthetic modification of switchable iron-based coordination polymers by volatile organic compounds: A versatile strategy for selective sensor development*  
E.Resines-Urien, J. S. Costa

## Poster contributions

*Activation of the Ir–N(pyridine) Bond in Half-Sandwich Tethered Iridium(III) Complexes*

Ana C. Carrasco, Vanessa Rodríguez-Fanjul, and Ana M. Pizarro

*Enhanced Differentiation of Neural Stem Cells on Nanopillar-patterned Substrates*

Miguel Esteban-Lucía, Judith Estengre Pérez, Silvia García-López, Jaime J Hernández, Marta P Pereira, Alberto Martínez-Serrano, Isabel Rodríguez

*Fluorescent tethered rhodium(III) and iridium(III) half-sandwich complexes*

Arturo Villechenous Rojo, Ana M. Pizarro

*Hybrid systems for metal-based bio-orthogonal catalysis on carbon nanotubes*

Federica Battistin, Ana M. Pizarro

*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

*Luminescent metal-organic frameworks embedded in a polymer matrix for chemical sensing*

Ahmad Sousarei\*, Juan Cabanillas-Gonzalez

*Magnetic detection of neural activity in spinal cord slices*

A. Vera, I. Martínez, R. Guerrero, I. Calaresu, J. Camarero, L. Ballerini, R. Miranda, M. T. Gonzalez, L. Perez

*Osmium(II) half-sandwich tethered complexes: activation, reactivity and catalytic behaviour*

Sonia Infante-Tadeo, Abraha Habtemariam, Adriana Arnáiz, Diane L. Barber and Ana M. Pizarro

*Planar and sharp nanotechnology-based electrodes for electrophysiological neural activity study*

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

*Ruthenium- and osmium-arene tethered complexes for selective activation in cancer cells*

Claudia Cardozo Yusti, Ana M. Pizarro

*Spin Orbit driven effects and Thermal Activation of Ferromagnet Intercalated Graphene-Heavy Metal Interfaces*

A. Gudín, J. M. Díez, P. Olleros-Rodríguez, A. Alberto Anadon, R. Guerrero, R. Miranda, J. Camarero, and P. Perna

*Spin state dependent electrical conductivity in single-wall carbon nanotubes encapsulating spin crossover molecules*

Aysegül Develioglu, Julia Villalva, Arturo Gamonal, Eduardo Rial, José Sánchez Costa, Emilio M. Pérez, Enrique Burzurí.

*On-surface synthesis of doubly-linked one-dimensional pentacene ladder polymer*

Kalyan Biswas, José I. Urgel, Ana Sánchez-Grande, Shayan Edalatmanesh, José Santos, Borja Cirera, Pingo Mutombo, Koen Lauwaet, Rodolfo Miranda, Pavel Jelínek, Nazario Martín, David Écija

*Development of tungsten carbide one-dimensional electronic devices by pulsed focused electron beam induced deposition (PFEBID)*

Cristina García-Pérez, Víctor Marzoa, Marina C. De Ory, María Acebrón, Julia García-Pérez, María-Teresa Magaz, Fernando J Urbanos, Alicia Gómez, Ramón Bernardo-Gavito, Daniel Granados

*Temperature dependence of the photoluminescence in few-layer MoS<sub>2</sub> circular suspended membranes*

Víctor Marzoa, C. García-Pérez, M. Acebró, M. R. Osorio, R. Bernardo-Gavito, D. Granados

17/12/2020

**Discussion Meeting on Progress in Organic Optoelectronics and Energy Conversion. Online**

## Oral contributions

*Charge Transfer States in Organic Optoelectronics and Energy Conversion*  
J. Gierschner

*Conjugated Polymer Based Microcavities for Lasing and Sensing*

J. Gonzalez\*, J. Cabanillas-Gonzalez, R. Wannemacher

*Effect of Phenyl-fluorene Backbone Intercalation in the Stimulated Emission Properties of Fluorene-based Polymer Blends*  
Juan Cabanillas-Gonzalez

*Influence of  $\pi$ -Phase Content on Photophysics and Light Amplifying Properties of Polydiarylfuorene*

Chen Sun\*, J. Cabanillas-Gonzalez

## 2. Conferences and Courses

01/01/2020

**Institute for Pure & Applied Mathematics, UCLA, Los Angeles**
*Theory and computation for 2D models.*  
Francisco Guinea (Invited)

14/01/2020

**Coimbra Institute for Clinical and Biomedical Research, Universidade de Coimbra Coimbra, Portugal**
*Phthalocyanines for Photodynamic Therapy*  
T. Torres (Invited)

28/01/2020

**Swiss Federal Laboratories for Materials Science and Technology (EMPA), Engelberg**
*Electric and thermoelectric properties of conjugated oligomers at the single molecule level*  
Edmund Leary (Invited)



**19/02/2020****Centro Nacional de Biotecnología, Madrid***Hybrid AFM and Fluorescence Nanoscopy to image amyloids: from materials to biomedicine*

Cristina Flors (Invited)

**28/02/2020****Colorado School of Mines, Golden CO, USA***Protected cat states in a driven superfluid boson gas*

Fernando Sols

**01/03/2020****Université de Bordeaux, France***Probing the interaction between magnetic nanoparticles and biological entities by AC magnetometry*

Francisco J. Teran

**05/03/2020****NARA Institute of Science and Technology (NAIST) Ikonoma, Japan***Subphthalocyanines: Singular aromatic non-planar molecules. Synthesis, supramolecular organization*

T. Torres

**02/03/2020****Universidad de Oviedo****Biomedical applications of magnetic nanomaterials School**

Francisco J. Teran

*Probing the interaction between magnetic nanoparticles and biological entities by AC magnetometry***06/03/2020****Instituto de Cerámica de Galicia, Santiago de Compostela***Probing the interaction between magnetic nanoparticles and biological entities by AC magnetometry*

Francisco J. Teran

**27/04/2020****Katholieke Universiteit Leuven (KU Leuven). Online***What we do in the sunshine: contributions from IMDEA Nano to the chemistry of 2D materials*

Emilio M. Pérez

**20/05/2020****Geneva Business School***How to run a successful team in today's fast-paced work environment - LEADERSHIP and Space Exploration*

H. Guerrero

**24/06/2020****Instituto de Ciencia de Materiales de Aragón (ICMA). Online***Chateando con la ciencia ahora on-line: El tsunami de la Nanotecnología*

Rodolfo Miranda (Invited)

**01/07/2020****Instituto de Ciencias Fotónicas ICFO. Online***Emergent phenomena in Moiré materials*

Francisco Guinea (Invited)

**02/07/2020****Institut des Sciences Chimiques de Rennes (ISCR). Online***What we do in the sunshine: tales of the chemistry of low-dimensional materials*

Emilio M. Pérez (Invited)

**01/09/2020****Department of Physics. University of Minnesota. Online**

Francisco Guinea (Invited)

**16/09/2020****Seminarios de Investigación "Alberto Tejedor" del Instituto de Investigación Sanitaria Instituto de Investigación Sanitaria Gregorio Marañón, Madrid. Online***ByAxon: el camino hacia un bypass activo para reconexiones neuronales*

Lucas Pérez (Invited)

**30/09/2020****Chemistry Europe Fellows Day, Real Sociedad Española de Química. Madrid. Online***Subphthalocyanines: Singular aromatic non-planar molecules*

T. Torres

**30/09/2020 & 2-3/10/2020****Universidad Carlos III de Madrid***Taxonomies for space systems engineering*

H. Guerrero

**07/10/2020****PhDay Físicas 2020. Online**

Arturo Vera, Lucas Pérez

<https://físicas.ucm.es/phday-físicas-2020>**11/10/2020****SNU Online Seminar Series on Photochemistry and Photophysics, Department of Materials Science and Engineering, Seoul National University, South Korea Online***Photophysics of Innovative Organic Charge-Transfer Systems*

Johannes Gierschner (Invited)

**21/10/2020****Institute of Polymer Optoelectronic Materials and Devices, School of Materials Science and Engineering, South China University of Technology***Luminescence Enhancement and Quenching in Organic Solids*

Johannes Gierschner (Invited)

**24/10/2020****Institute of Polymer Optoelectronic Materials and Devices, School of Materials Science and Engineering, South China University of Technology. Online***Photophysics of Supramolecular Polymers for Artificial Light-Harvesting*

Johannes Gierschner (Invited)

01/11/2020

**Department of Physics, University of Indiana. Online**
*Twisted Layers, Narrow Bands, and New Phases in Two Dimensional Materials*

Francisco Guinea (Invited)

04/11/2020

**ITMO University, Saint Petersburg**
*Electronic structure and interactions in twisted bilayer graphene*

Francisco Guinea (Invited)

04/11/2020

**Queen Mary University of London (QMUL). Online**
*In control of surface and electronic properties of SWNTs via mechanical interlocking*

Emilio M. Pérez

17/11/2020

**Functional Materials Seminar of the European Powder Metallurgy Association (EPMA) Online**
*Rare-earth free permanent magnet powder and functional applications*

Alberto Bollero (Invited)

**Institute of Polymer Optoelectronic Materials and Devices, School of Materials Science and Engineering, South China University of Technology Online**
*Charge Transfer States in Organic Photoresponsive Materials*

Johannes Gierschner

26/11/2020

**Universidad Carlos III de Madrid**
*LEADERSHIP in the Space Sector*

H. Guerrero

27/11/2020

**Seminars in Biotechnology and Bioengineering, Institut for Bioengineering,**
**Universidad Miguel Hernández de Elche. Online**
*Phthalocyanines based photosensitizers for photodynamic therapy*

T. Torres

10/12/2020

**Universidad Autónoma de Madrid Online**
*Twisted layers, narrow bands, and new phases in two dimensional materials*

Francisco Guinea (Invited)

03/12/2020

**Monthly webinar of the American Society for Photobiology. Online**
*Nanoscale imaging of amyloid photodynamic damage*

Cristina Flors

10/12/2020

**IFIMAC+ICMM Joint Seminars Madrid**
*Twisted layers, narrow bands, and new phases in two dimensional materials*

Francisco Guinea (Invited)

<http://gefes-rsef.org/ifimacicmm-joint-seminars-francisco-guinea-december-10th-2020/>

### 3. Outreach activities

14/01/2020

**Rueda de prensa del Consejo de Gobierno - 14 de enero de 2020 en IMDEA Nanociencia**

Ignacio Aguado, Vicepresidente de la Comunidad de Madrid

<https://twitter.com/ComunidadMadrid/status/1217051716002205696>

Comunidad de Madrid

<https://www.comunidad.madrid/noticias/2020/01/14/impulsamos-institutos-madrilenos-estudios-avanzados>

27/01/2020

**Madrid al frente de la investigación para la recuperación de funciones ante lesiones medulares**

BYAXON project

[https://cadenaser.com/emisora/2020/01/27/ser\\_madrid\\_norte/1580128814\\_757968.html](https://cadenaser.com/emisora/2020/01/27/ser_madrid_norte/1580128814_757968.html)
**Madrid lidera la investigación de un bypass para lesiones medulares**

BYAXON project

<http://www.telemadrid.es/programas/telenoticias-1/Madrid-lidera-investigacion-lesiones-medulares-2-2199100095--20200127034819.html>
**Visita del Vicepresidente Ignacio Aguado y Consejero de Ciencia Eduardo Sicilia a IMDEA Nanociencia**
<https://twitter.com/ignacioaguado/status/1221860217509511173>

03/03/2020

**Blog post - Cover of Nanoscale Horizons**
<https://scixel.es/red-light>

17/04/2020

**Eduardo Sicilia sobre test de COVID-19 en El Barometro de Inter Radio**
<https://twitter.com/edsicilia/status/1251158242677256195?s=20>

20/04/2020

**Aparición en Buenos Días Madrid de Telemadrid**

Alvaro Somoza

<http://www.telemadrid.es/programas/telenoticias-1/Comunidad-Madrid-propios-detectar-covid-19-2-2224297565--20200420025655.html>
**Entrevista en Inter Almería TV**

Rodolfo Miranda

<https://twitter.com/interalmeriatv/status/1252213364320866304?s=20>



**Test rápido para el coronavirus que se desarrolla en el madrileño IMDEA “la clave está en un líquido con nanopartículas de oro”**

Alvaro Somoza

<https://twitter.com/telemadrid/status/1252136580397051905?s=20>

21/04/2020

**Desarrollan un sensor con nanopartículas de oro para detectar la COVID-19**

Alvaro Somoza

<https://twitter.com/informativost5/status/1252293704196542464?s=20>

01/05/2020

**#IMDEAnanoPics campaign - marcapáginas**

On Twitter, Facebook and Instagram #IMDEAnanoPics

01/06/2020

**Contribution to a book: “Ciencia y Cosmos del siglo XXI”**

Francisco Guinea

<https://drive.google.com/file/d/1pry1EGJO2YDWS6nDDtq12gAPgs5mEYMH/view?usp=sharing>

18/06/2020

**Front cover of Nature Nanotechnology June 2020 Issue**

**ELECNANO project**

David Ecija

<https://www.nature.com/nnano/volumes/15/issues/6>

25/06/2020

**Campaña #InvestigarEsAvanzar Comic sobre la publicación científica en Small, co-financiada por la AECC**  
**AECC project**

Ana Espinosa

[https://twitter.com/aecc\\_es/status/1276068011405914112?s=20](https://twitter.com/aecc_es/status/1276068011405914112?s=20)

27/08/2020

**Podcast Coffee Break SyR 282: Agujeros negros en el Sistema Solar, nanoelectrodos, hierro-60 y supernovas, y mucho más**  
**BYAXON project**

<https://francis.naukas.com/2020/08/28/podcast-cb-syr-282-varias-noticias/?fbclid=IwAR1tKU7JdukXGrbfjwfWhmfK7Oa0dG1LmPOK6UbCk2wwBqSLGyymDph0K04>

07/09/2020

**A LEAF - On the road to solar fuels**  
**ALEAF project**

<https://www.youtube.com/watch?v=Pr8Hu321z-A>

22/09/2020

**Future Tech Week #EICFTW**  
**BYAXON project**

[https://twitter.com/search?q=from%3Abyaxon\\_project%20eicftw](https://twitter.com/search?q=from%3Abyaxon_project%20eicftw)

23/09/2020

**Programa “Aquí hay trabajo” de La2 de RTVE**  
**AECC project**

Ana Espinosa

<https://www.rtve.es/alacarta/videos/aqui-hay-trabajo/investigar-contracancer/5668798/>

23/11/2020

**NANOCIENCIA TO-GO “Difracción de la luz y color”**

[https://youtu.be/\\_5m7A8cu6p4](https://youtu.be/_5m7A8cu6p4)

**NANOCIENCIA TO-GO “El atardecer en un vaso de agua”**

<https://youtu.be/PYWAE8kpM7w>

**NANOCIENCIA TO-GO “Un experimento de premio Nobel”**

<https://youtu.be/PYWAE8kpM7w>

**NANOCIENCIA TO-GO video promocional**

<https://youtu.be/Bfz5p5TgAaE>

27/11/2020

**NOCHE EUROPEA INVESTIGADORES - Grandes científicas en la gran pantalla**

Featured by MSCA fellows at IMDEA Nanociencia

02/12/2020

**NOCHE EUROPEA INVESTIGADORES - Grandes científicas en la gran pantalla**

<https://www.youtube.com/watch?v=heZ8qKcQLc&feature=youtu.be>

## Exhibitions

23/04/2020

**XI Feria Madrid Es Ciencia 2020. Online**

**V. Marzoa, C. García-Pérez, R. Bernardo-Gavito, D. Granados**

<https://www.madrimasd.org/feriamadridesciencia>

02/11/2020

**Semana de la Ciencia y la Innovación 2020. Online**

Virtual exhibition on social media #IMDEANANOPICS

Virtual lab tour

05/11/2020

**#CienciaEnCasa Taller de Luminiscencia de la AECC**

Alvaro Somoza

<https://www.facebook.com/unidoscontraelcancer/videos/698412790780499>

20/11/2020

**Visita al Colegio Virgen de Europa (Boadilla del Monte)**

Daniel Granados

[https://twitter.com/Colegio\\_CVE/status/1329769454033629185/photo/1](https://twitter.com/Colegio_CVE/status/1329769454033629185/photo/1)

02/12/2020

**Noche Europea Investigadores****How to prepare carbon nanopoints (CNDs) at home?**

Online

Encarnación Lorenzo

**Press clippings**

12/01/2020

**Four DIPC Researchers in the list of the Highly Cited Researchers**
[http://dipc.ehu.es/06anuncios\\_detalle.php?id=1372&lng=eng](http://dipc.ehu.es/06anuncios_detalle.php?id=1372&lng=eng)

14/01/2020

**Impulsamos los Institutos Madrileños de Estudios Avanzados**
<https://www.comunidad.madrid/noticias/2020/01/14/impulsamos-institutos-madrilenos-estudios-avanzados>
**Los Institutos Madrileños de Estudios Avanzados generan 41,4 millones**
<https://www.lavanguardia.com/vida/20200114/472898965705/los-institutos-madrilenos-de-estudios-avanzados-generan-414-millones.html>

20/01/2020

**Thermally Activated Processes for Ferromagnet Intercalation in Graphene-Heavy Metal Interfaces**
<https://www.imdeanociencia.org/home-en/news/item/thermally-activated-processes-for-ferromagnet-intercalation-in-graphene-heavy-metal-interfaces>

22/01/2020

**Nanoscale imaging provides clues towards dementia treatment**
<http://nanociencia.imdea.org/home-en/news/item/nanoscale-imaging-provides-clues-towards-dementia-treatment>

27/01/2020

**El Programa ByAxon fabrica sensores que sean capaces de detectar el campo magnético producido por la actividad neuronal**
<https://www.europapress.es/madrid/noticia-aguado-acusa-sanchez-despreciar-todo-pueblo-venezolano-pide-abalos-poco-mas-pudor-20200127124802.html>
**Madrid lidera la investigación de un bypass para lesiones medulares**
<https://www.lavanguardia.com/politica/20200127/473165223254/madrid-lidera-la-investigacion-de-un-bypass-para-lesiones-medulares.html>
**Madrid lidera la investigación de un bypass para lesiones medulares - visita del Vicepresidente de la Comunidad de Madrid Ignacio Aguado**
<https://www.madridiario.es/mvc/amp/noticia/475354>
**Madrid lidera un proyecto europeo de implantes para recuperar funciones tras una lesión medular**
[https://www.abc.es/espana/madrid/abci-madrid-lidera-proyecto-europeo-implantes-para-recuperar-funciones-tras-lesion-medular-202001271636\\_noticia.html?ref=https%3A%2F%2Fwww.google.com%2F](https://www.abc.es/espana/madrid/abci-madrid-lidera-proyecto-europeo-implantes-para-recuperar-funciones-tras-lesion-medular-202001271636_noticia.html?ref=https%3A%2F%2Fwww.google.com%2F)

02/02/2020

**Rodolfo Miranda: “Tener un lugar en el que investigar es un sueño”**
<https://www.lavozdealmeria.com/noticia/12/almeria/186085/tener-un-lugar-en-el-que-investigar-es-un-sueno>

05/02/2020

**Eukaryotic transcription factors can track and control their target genes using DNA antennas**
<http://nanociencia.imdea.org/home-en/news/item/eukaryotic-transcription-factors-can-track-and-control-their-target-genes-using-dna-antennas>
[track-and-control-their-target-genes-using-dna-antennas](http://nanociencia.imdea.org/home-en/news/item/eukaryotic-transcription-factors-can-track-and-control-their-target-genes-using-dna-antennas)

11/02/2020

**Cs impulsará las medidas necesarias para convertir a Madrid en un “referente en el acceso de las mujeres y las niñas a la ciencia”**
<http://www.diariosigloxxi.com/texto-s-mostrar/350957/cs-impulsara-medidas-necesarias-convertir-madrid-referente-acceso-mujeres-ninas-ciencia>

20/02/2020

**Nanoimaging the intracellular space to aid drug development**
<https://www.imdeanociencia.org/home-en/news/item/nanoimaging-the-intracellular-space-to-aid-drug-development>

26/02/2020

**Imaging how anticancer compounds move inside the cells**
<https://www.cells.es/en/media/news/imaging-how-anticancer-compounds-move-inside-the-cells>

02/03/2020

**La Fotónica en la detección del coronavirus**
<http://www.secpho.org/noticias/la-fotonica-en-la-deteccion-del-coronavirus/>
**Light in the Tunnel**
<https://www.ifimac.uam.es/light-in-the-tunnel/>

05/03/2020

**Aforo completo en la conferencia sobre aplicaciones Bio-Médicas del magnetismo impartida por el Dr. Francisco Terán de IMDEA Nanociencia**
[https://fisica.uniovi.es/noticias/-/asset\\_publisher/0002/content/aforo-completo-en-la-conferencia-sobre-aplicaciones-bio-medicas;jsessionid=B71998EC0909D49992CC6D051CA7816B?redirect=%2F](https://fisica.uniovi.es/noticias/-/asset_publisher/0002/content/aforo-completo-en-la-conferencia-sobre-aplicaciones-bio-medicas;jsessionid=B71998EC0909D49992CC6D051CA7816B?redirect=%2F)



19/03/2020

**Nanoimaging the intracellular space to aid drug development**

<https://phys.org/news/2020-03-nanoimaging-intracellular-space-aid-drug.html>

<https://www.nanowerk.com/nanotechnology-news2/newsid=54793.php>

<http://www.madrimasd.org/notiweb/noticias/nanoscopia-espacio-intracelular-avanzar-desarrollo-farmacos>

<https://sciglow.com/nanoimaging-the-intracellular-space-to-aid-drug-development/>

25/03/2020

**Light in the Tunnel**

<http://nanociencia.imdea.org/home-en/news/item/the-light-in-the-tunnel>

<http://www.madrimasd.org/notiweb/noticias/luz-en-tunel>

[http://www.nanotech-now.com/news.cgi?story\\_id=56097](http://www.nanotech-now.com/news.cgi?story_id=56097)

<https://phys.org/news/2020-03-methodology-characterization-light-matter-interaction-atomic.html>

<https://www.azonano.com/news.aspx?newsID=37209>

<https://www.nanowerk.com/nanotechnology-news2/newsid=54834.php>

30/03/2020

**La UAH, participa en el proyecto BIOMAG, que detecta dolencias cardíacas a través de biomarcadores en fluidos biológicos**

<http://portalcomunicacion.uah.es/diario-digital/reportaje/la-uah-implicada-en-el-proyecto-biomag-que-detecta-dolencias-cardiacas-a-traves-de-biomarcadores-en-fluidos-biologicos.html>

**Max Planck Partner Group at IMDEA Nanociencia**

<http://www.nanociencia.imdea.org/home-en/news/item/max-planck-partner-group-at-imdea-nanociencia>

06/04/2020

**IMDEA Nanociencia desarrolla un innovador test diagnóstico del Coronavirus**

<https://www.madridaerospace.es/imdea-nanociencia-desarrolla-uninnovador-testdiagnostico-del-coronavirus/>

07/04/2020

**Covid-19: Prevención, antivirales y nanotecnología, entre los nuevos ensayos financiados por el ISCIII**

<https://elglobal.es/industria/covid-19-prevencion-antivirales-y-nanotecnologia-entre-los-nuevos-ensayos-financiados-por-el-isciii/>

**El Instituto de Salud Carlos III financia seis nuevos ensayos sobre el Covid-19**

<https://elmedicointeractivo.com/el-instituto-de-salud-carlos-iii-financia-seis-nuevos-ensayos-sobre-el-covid-19/>

**El ISCIII financia seis nuevos ensayos para mejorar la prevención, diagnóstico y tratamiento del COVID-19**

<https://gacetinmadrid.com/2020/04/07/el-isciii-financia-seis-nuevos-ensayos-para-mejorar-la-prevencion-diagnostico-y-tratamiento-del-covid-19/>

**El ISCIII financia seis nuevos ensayos sobre el coronavirus**

[https://www.consalud.es/pacientes/especial-coronavirus/isciii-financia-ensayos-coronavirus\\_77262\\_102.html](https://www.consalud.es/pacientes/especial-coronavirus/isciii-financia-ensayos-coronavirus_77262_102.html)

**IMDEA Nanoscience develops an innovative diagnostic test for Coronavirus to be financed by the Carlos III Health Institute (ISCIII)**

<http://nanociencia.imdea.org/home-en/news/item/imdea-nanociencia-desarrolla-un-innovador-test>

09/04/2020

**Broad spectrum: Novel hybrid material proves an efficient photodetector**

<https://phys.org/news/2020-04-broad-spec->

<trum-hybrid-material-efficient.html>

[https://www.osa-opn.org/home/news-room/2020/april/mof-based\\_broadband\\_photodetector/?feed=News](https://www.osa-opn.org/home/news-room/2020/april/mof-based_broadband_photodetector/?feed=News)

<https://www.pro-physik.de/nachrichten/hybridmaterial-als-breitband-fotodetektor>

13/04/2020

**Instituto de salud pública carlos iii: un centro de referencia contra el coronavirus**

<https://www.thisistherealspain.com/actualidad/instituto-de-salud-publica-carlos-iii-un-centro-de-referencia-contra-el-coronavirus/>

**Materia - El País - La ciencia cuando truena**

<https://elpais.com/ciencia/2020-04-13/ciencia-cuando-truena.html>

16/04/2020

**Aguado se reúne con investigadores madrileños para conocer el avance de sus trabajos sobre el Covid-19"**

<http://www.diariosigloxxi.com/texto-s/mostran/360720/aguado-reune-investigadores-madrilenos-conocer-avance-trabajos-sobre-covid-19>

**Aguado se reúne con investigadores madrileños que estudian nuevos test "más rápidos y certeros"**

<http://www.gentedigital.es/madrid/noticia/2857950/aguado-se-reune-con-investigadores-madrilenos-que-estudian-nuevos-test-mas-rapidos-y-certeros/>

<https://www.lavanguardia.com/local/madrid/20200416/48563796818/aguado-se-reune-con-investigadores-madrilenos-que-estudian-nuevos-test-mas-rapidos-y-certeros.html>

**Aguado se reúne con investigadores madrileños que estudian nuevos test de coronavirus "más rápidos y certeros"**

<https://www.europapress.es/madrid/noticia-aguado-reune-investigadores-madrilenos-estudian-nuevos-test-coronavirus-mas-rapidos-certeros-20200416173705.html>

17/04/2020

**Aguado se reúne con investigadores madrileños que estudian nuevos tests más rápidos y certeros**

<https://www.teleprensa.es/es/nacional/aguado-se-reune-con-investigadores-madrilenos-que-estudian-nuevos-test-mas-rapidos-y-certeros.html>

**Desarrollan una prueba rápida y precisa para identificar casos de infección del coronavirus**

<https://www.tekcrispy.com/2020/04/17/prueba-rapida-precisa-identificar-coronavirus/>

**Madrid desarrolla un test para diagnosticar coronavirus de forma “más rápida, sencilla y certera”**

<https://lahoradigital.com/noticia/27033/salud/madrid-desarrolla-un-test-para-diagnosticar-coronavirus-de-forma-mas-rapida-sencilla-y-certera.html>

**Test colorimétrico con nanopartículas de oro para detectar el coronavirus**

<https://www.agenciasinc.es/Noticias/Test-colorimetrico-con-nanoparticulas-de-oro-para-detectar-el-coronavirus>

<https://www.benlgo.es/noticias/test-colorimetrico-con-nanoparticulas-de-oro-para-detectar-el-coronavirus.html>

18/04/2020

**Aguado pone el foco en un test sobre el coronavirus aún en curso**

<https://www.20minutos.es/noticia/4231581/0/aguado-pone-el-foco-en-un-test-sobre-el-coronavirus-aun-en-curso/>

19/04/2020

**Rodolfo Miranda, el almeriense que investiga para controlar el virus**

<https://www.lavozdealmeria.com/noticia/12/almeria/191422/rodolfo-miranda-el-almeriense-que-investiga-para-controlar-el-virus>

20/04/2020

**Desarrollan un sensor con nanopartículas de oro para detectar la COVID-19**

[https://www.telecinco.es/informativos/ciencia/test-colorimetrico-detectar-coronavirus\\_18\\_2933970270.html](https://www.telecinco.es/informativos/ciencia/test-colorimetrico-detectar-coronavirus_18_2933970270.html)

**The regional TV Telemadrid visits IMDEA Nanociencia to learn about the RNA\_NanoTest COVID-19 project**

<http://nanociencia.imdea.org/home-en/news/item/the-regional-tv-telemadrid-visits-imdean-nanociencia-to-learn-about-the-rna-nanotest-covid-19-project>

21/04/2020

**Desarrollan un sensor con nanopartículas de oro para detectar la COVID-19**

<https://www.estrelladigital.es/articulo/ciencia-y-tecnologia/desarrollan-sensor-nanoparticulas-oro-detectar-covid-19/20200421204623413578.html>

<https://www.lavanguardia.com/vida/20200421/48673491579/desarrollan-un-sensor-con-nanoparticulas-de-oro-para-detectar-la-covid-19.html>

**IMDEA Nanociencia desarrolla un innovador test diagnóstico del Coronavirus que será financiado por el Instituto de Salud Carlos III (ISCIII)**

<https://nanomedspain.net/imdea-nanociencia-desarrolla-un-innovador-test-diagnostico-del-coronavirus-que-sera-financiado-por-el-instituto-de-salud-carlos-iii-isciii/>

**Test colorimétrico con nanopartículas de oro para detectar el coronavirus**

[https://www.madrimasd.org/notiweb/noticias/test-colorimetrico-nanoparticulas-oro-detectar-coronavirus#utm\\_source=notiweb\\_newsletter&utm\\_medium=email&utm\\_campaign=noti5\\_21apr20](https://www.madrimasd.org/notiweb/noticias/test-colorimetrico-nanoparticulas-oro-detectar-coronavirus#utm_source=notiweb_newsletter&utm_medium=email&utm_campaign=noti5_21apr20)

**Test con nanopartículas de oro para detectar el coronavirus, una alternativa a los PCR**

<https://innovadores.larazon.es/es/test-con-nanoparticulas-de-oro-para-detectar-el-coronavirus-alternativa-pcr/>

22/04/2020

**Test colorimétrico con nanopartículas de oro para detectar el coronavirus**

<http://www.cibersur.com/cibersur/impe/internet/020829/test/colorimetrico/nanoparticulas/oro/detectar/coronavirus>

28/04/2020

**Desarrollar una vacuna y agilizar el diagnóstico: así son los proyectos que impulsa el fondo público contra la covid**

<https://www.publico.es/politica/desarrollar-vacuna-agilizar-diagnostico-son-proyectos-impulsa-fondo-publico-covid.html>

29/04/2020

**MOF material offers optical sensing of NO2 pollutant for air quality measurements**

<http://nanociencia.imdea.org/home-en/news/item/mof-material-offers-optical-sensing-of-no2-pollutant-for-air-quality-measurements>

<https://phys.org/wire-news/349609586/mof-material-offers-optical-sensing-of-no2-pollutant-for-air-qua.html>

<http://www.madrimasd.org/notiweb/noticias/un-material-mof-deteccion-optica-no2>

[http://www.nanotech-now.com/news.cgi?story\\_id=56142](http://www.nanotech-now.com/news.cgi?story_id=56142)

<https://noticiasdelaciencia.com/art/37803/un-material-mof-para-la-deteccion-optica-de-no2>

<https://www.azom.com/news.aspx?newsID=53327>

<https://www.nanowerk.com/nanotechnology-news2/newsid=55030.php>

<https://www.technologynetworks.com/analysis/news/air-pollutant-detection-using-mof-material-334141>



02/05/2020

**Demuestran que el coronavirus permanece horas en el aire: el peligro de sitios cerrados**

[https://www.elconfidencial.com/tecnologia/ciencia/2020-05-02/horas-aire-virus-espania-cerrados-peligro-ventilar\\_2575075/](https://www.elconfidencial.com/tecnologia/ciencia/2020-05-02/horas-aire-virus-espania-cerrados-peligro-ventilar_2575075/)

03/05/2020

**Test colorimétrico con nanopartículas de oro para detectar el coronavirus**

<https://www.cronicadelquindio.com/noticia-completa-titulo-test-colorimetrico-con-nanoparticulos-de-oro-para-detectar-el-coronavirus-cronica-del-quindio-nota-138744>

04/05/2020

**The Danger of Closed Spaces: Study in Spain Shows that the Coronavirus May Linger in The Air For Hours**

<https://www.euroweeklynews.com/2020/05/04/the-danger-of-closed-spaces-study-in-spain-shows-that-the-coronavirus-may-linger-in-the-air-for-hours/>

05/05/2020

**Towards metallic polymers by exploiting two faces of the same coin: topological order and  $\pi$ -conjugation**

<http://nanociencia.imdea.org/home-en/news/item/towards-metallic-polymers>  
<https://phys.org/news/2020-05-metallic-polymers-exploiting-topological-conjugation.html>  
<https://www.nanowerk.com/nanotechnology-news2/newsid=55076.php>

09/05/2020

**Test colorimétrico con nanopartículas de oro para detectar el coronavirus**

<http://www.sld.cu/node?iwpost=2020%2F05%2F10%2Ftest%20colorim%C3%A9trico%20con%20nanopart%C3%ADculas%20de%20oro%20para%20detectar%20el%20>

[coronavirus%2F183682&iwp\\_ids=1\\_83682&blog=1\\_aldia](coronavirus%2F183682&iwp_ids=1_83682&blog=1_aldia)

14/05/2020

**Towards metallic polymers by exploiting two faces of the same coin: topological order and  $\pi$ -conjugation**

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## Social media

### TWITTER

La cuenta oficial de IMDEA Nanociencia es la principal red social para la difusión de la ciencia. En 2020 tuvo hasta 2500 seguidores, y un total de 530k impresiones. [https://twitter.com/IMDEA\\_Nano](https://twitter.com/IMDEA_Nano)

### FACEBOOK

La página de IMDEA Nanociencia en Facebook mantiene a sus seguidores actualizados con las últimas noticias de nuestro instituto. En 2020 tuvimos hasta 700 seguidores. <https://www.facebook.com/IMDEAnanociencia/>

### YOUTUBE

IMDEA Nanociencia explica proyectos, líneas de investigación y publicaciones en breves vídeos. Los YouTubers de nuestro instituto se destacan en nuestras listas de reproducción.

[https://www.youtube.com/channel/UCyL-J\\_nvT6Um1-xvRPpg3oA](https://www.youtube.com/channel/UCyL-J_nvT6Um1-xvRPpg3oA)

### LINKED-IN

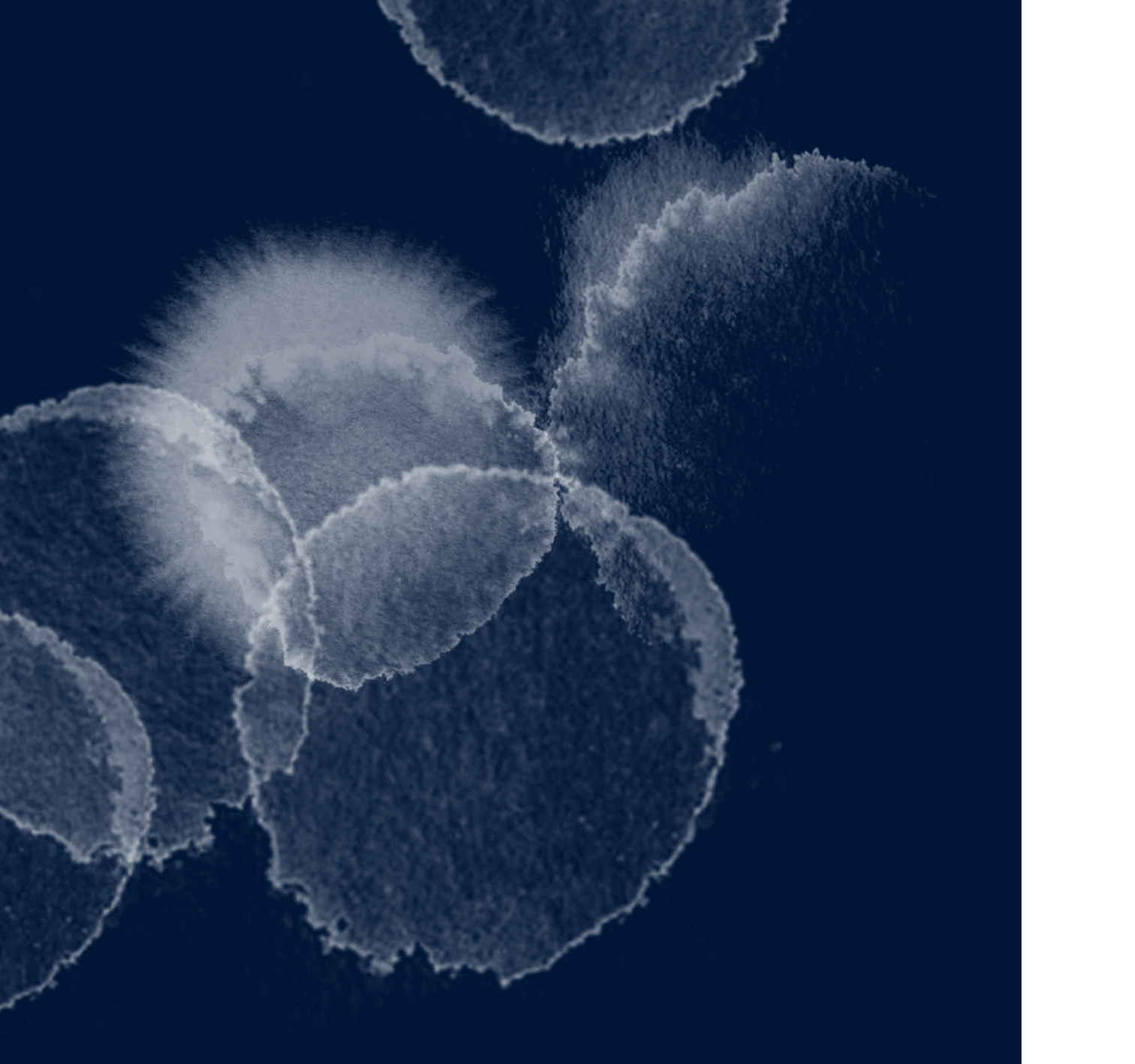
Encuentra ofertas de trabajo, mantente en contacto con los compañeros de trabajo. En el último año, la cuenta ha aumentado considerablemente sus seguidores hasta 1500.

<https://www.linkedin.com/company/imdea-nanociencia/>

### INSTAGRAM

En el año 2020 IMDEA Nanociencia estrena cuenta de Instagram para conectar con el público más joven. En la actualidad, la cuenta tiene 600 seguidores.

<https://www.instagram.com/IMDEAnanociencia/>



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