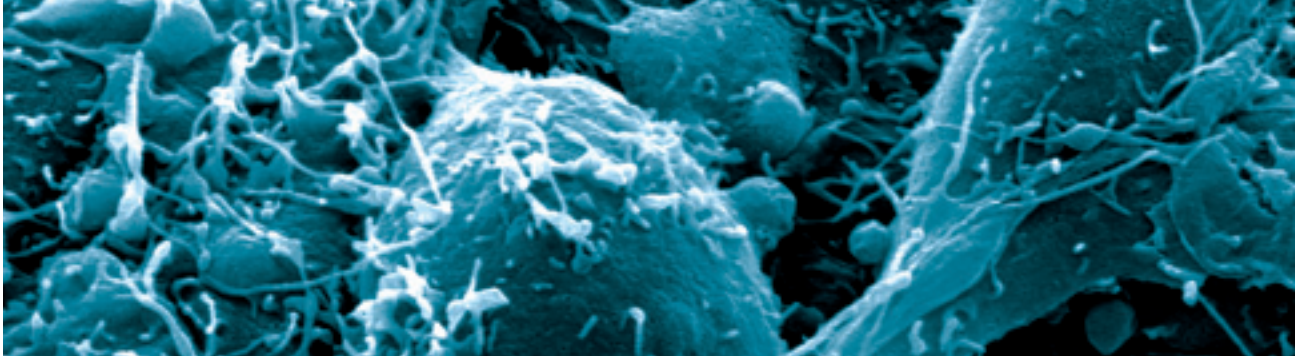


imdea nanoscience institute

nanoscience and nanotechnology: small is different

institute
imdea
nanoscience

annual report 2014

foreword

foreword

Rodolfo Miranda
Director, IMDEA Nanoscience Institute
april 2015

annual report
2014

The development of IMDEA Nanociencia during 2014 can only be qualified as spectacular. New labs have been created, equipped and are fully operational, new talented and motivated scientists have been incorporated and the activities of the Institute have continued at an astonishing pace.

The scientific production of 2014 amounts to more than 170 publications in the most respected journals. The number of citations in 2014 to papers published by scientists of IMDEA Nanociencia is over 2,500, with a total in the order of 8,500 citations accumulated and an institutional h-factor of 44, but also patent production is growing, with 5 more being filed during 2014.

Basic research is flourishing at IMDEA Nanociencia. The evaluation report by the Scientific Advisory Committee of the past 5 years acknowledges the important scientific achievements and instrumental developments.

Accordingly, our scientists have continued receiving honors and distinctions. Let me mention in this sense, the Miguel Catalán Prize for Young Scientists that has been awarded in 2014 to Dr. Emilio Pérez.

Ensuring the right balance between basic research, driven strictly by curiosity, and knowledge transfer, driven by the strategic needs of companies, is essential to root firmly the Institute in our society. I do believe we are doing an excellent job in this respect. During 2014 we have contributed substantially to the consolidation of this model of knowledge transfer, based on identifying the medium-term, strategic needs of companies to include their future technological challenges in our developing research programmes. A paradigmatic example is the SONAR project that we have developed with REPSOL to provide them with a roadmap on how nanotechnology is going to address the challenges (and affect their business) in the next 10-15 years. This project has been a tremendous success thanks to the excellent work carried out by our scientists and managers involved. I am convinced that this line of work, i.e. identifying technological challenges that contain enough basic science to excite our scientists and, at the same time, enough practical relevance to be of real interest for companies, hospitals or other institutions of the society, will prove both inspiring and fruitful.

The future of the Institute is bright. It is a consolidated reality that is appreciated by anyone that comes to visit us. Interdisciplinary efforts are blooming, exciting scientific results are obtained almost every day, our recognition in the world is increasing; the support from the Administrations is strong and steady. All of this is mainly due to the enthusiastic efforts of researchers, technicians, managers and the rest of the personnel working in our building. I would like to thank them all for shaping a bright future for IMDEA Nanociencia.

table of contents

table of contents

annual report

2014

overview

annual report 2014

1.1. Legal Status

IMDEA Nanociencia is a private non-profit Foundation created on the initiative of the Madrid Regional Government in November 2006 in order to overcome the gap separating fundamental research and the needs of society in the Madrid region and to 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 Autonomous Community of Madrid.

The Foundation is governed by a Board of Trustees, which has representatives of the national and regional administration, the academic institutions (Complutense, Autónoma and Politecnica Universities, Consejo Superior de Investigaciones Cientificas), industries, members of the Scientific Advisory Council, and experts in the 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 collaboration with innovative industries. The IMDEA Nanociencia Institute forms a part of one of the strategic lines of the Campus of International Excellence (CEI) UAM+CSIC.

1.2. Strategic Goals

In the region of Madrid there is already a large community of physicists, chemists and biologists working actively on diverse aspects of Nanoscience. Many of these groups have a recognised international prestige in their respective fields; nevertheless, a new step forward is needed to facilitate the future international competitiveness of R+D in Nanoscience and Nanotechnology. The very nature of this new discipline demands the creation of a suitable organisational and working environment to promote the continuous interdisciplinary interaction between specialists in condensed matter physics, chemistry, molecular biology, computer sciences, etc.

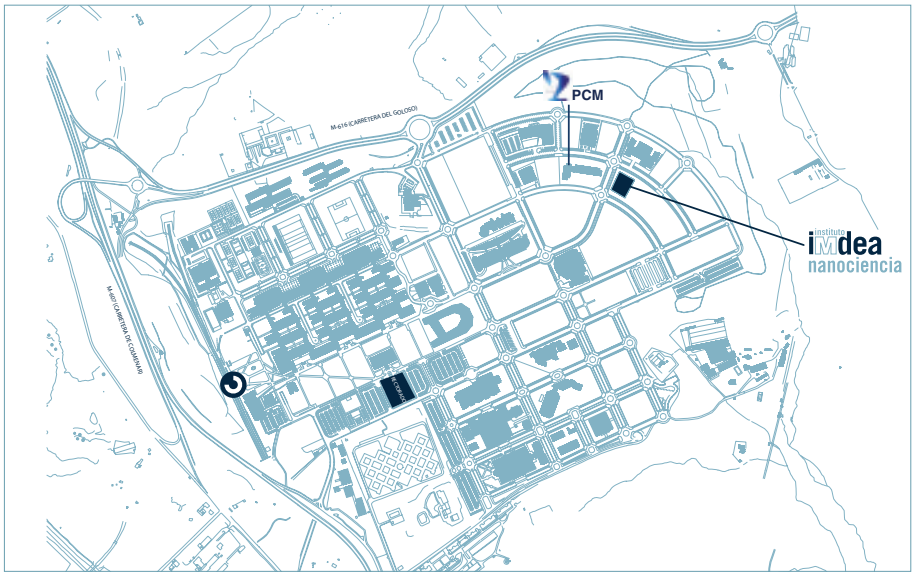
Moreover, it is essential to be able to recruit and retain new scientific talent and to repatriate young scientists working abroad, to train a new generation of technicians and scientists in a genuine interdisciplinary field, and to create and maintain new experimental equipment and advanced infrastructure where they can serve a broad scientific community.

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 demanding periodic evaluations, IMDEA Nanociencia aims at becoming an internationally recognised research centre; whilst maintaining a clear support from the existing scientific community in Madrid.

1.3. Location

IMDEA Nanociencia was provisionally located in space from the School of Sciences of UAM and the School of Chemistry of UCM. The new IMDEA Nanociencia building is located on the UAM Campus in Cantoblanco, near Madrid. The foundation stone was laid in a public ceremony on January 13th 2010 and building was completed by December 2011, it has been fully operational since June 2012. The modern building housing the IMDEA Nanociencia Institute was inaugurated on Monday January 13th 2014 by the President of the Community of Madrid, Excmo. Sr. D. J. Ignacio González. Its 8,200 m2 is host to 44 laboratories, offices and facilities such as the Centre for Nanofabrication of the Campus of International UAM+CSIC and the Centre for Ultra-High Resolution Electron Microscopy. The location of the Institute in an environment characterised by its excellence in related research areas is ideal given the interdisciplinary nature of research in Nanoscience.

The new building of IMDEA Nanociencia will host approximately 75 senior and postdoctoral researchers from different areas, 20 laboratory technicians, 15 management and administration staff and a number of graduate students. The building has been designed to hold sufficient free space to ensure the rotation of research groups and the future incorporation of new programmes.



IMDEA Nanociencia. Universidad Autónoma de Madrid. Cantoblanco Campus.

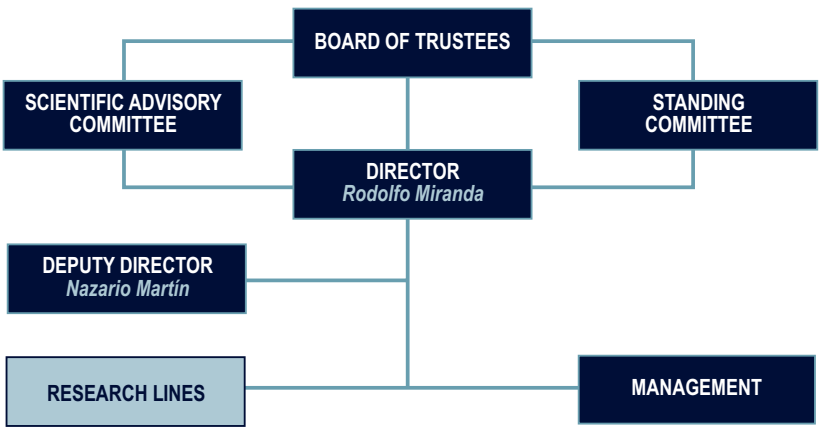
1.4. Recruitment Procedure

Staff scientists of IMDEA Nanociencia are recruited on the basis of International Open Calls in which the candidates present a scientific proposal and a CV. The Scientific Advisory Committee then selects a group of candidates to be interviewed by the Management. After the selection and negotiation process, the candidates are presented to the Board of Trustees and the offer is then made. Postdocs and PhDs are also recruited on an internationally competitive basis, but selected directly by their corresponding supervisors from the scientific staff.

Researchers from different universities, the CSIC or other public institutions may also apply via the same selection procedure and be incorporated to the Institute as associated members for periods of five years to develop specific research projects. The corresponding agreements with different academic institutions have been signed.

As a result of the recruitment procedure, more than 100 scientists work at IMDEA Nanociencia, 18 of which are associate scientists, and 48 are paid by various competitive programmes. Currently, 30% of the scientific staff is foreign (9 different countries), and 88% have previously worked in foreign institutions

1.5. Management Structure



1.6. Board of Trustees

PRESIDENT OF THE FOUNDATION

Prof. Ivan Schuller
Physics Department and California Institute of Telecommunication and Information Technology (Calit2) University of California-San Diego. USA

INSTITUTIONAL TRUSTEES

Mrs. Alicia Delibes
Vice-counselor for Education Madrid Regional Government. Spain

Mrs. Rocío Albert
(until November 2014)
Director General of Universities and Research
Madrid Regional Government. Spain

Mrs. Lorena Heras
(since November 2014)
Director General of Universities and Research
Madrid Regional Government. Spain

Mr. Juan Ángel Botas
Deputy Director for Research, Madrid Regional Government. Spain

Mr. José de la Sota
Managing Director Fundación madri+d para el Conocimiento, Madrid. Spain

Mr. Juan María Vázquez *(until February 2014) &* **Mrs. Marina Villegas**
(since February 2014)
General Director for Scientific and Technical Research Ministry of Economy and Competitiveness. Spain

Mrs. Marina Villegas *(until February 2014) &* **Mr. Clemente Jose López**
(since February 2014)
Vicedirector for Research Projects Ministry of Economy and Competitiveness. Spain

ACADEMIC TRUSTEES

Prof. Pedro Serena
(until June 2014)
Consejo Superior de Investigaciones Científicas (CSIC). Spain

Prof. Manuel Ocaña
(since June 2014)
Consejo Superior de Investigaciones Científicas (CSIC). Spain

Prof. José María González-Calbet
Universidad Complutense de Madrid. Spain

Prof. Rafael Garesse
Universidad Autónoma de Madrid. Spain

Prof. Elías Muñoz
Universidad Politécnica de Madrid. Spain

SCIENTIFIC TRUSTEES

Prof. Luis Echegoyen
University of Texas at El Paso, USA

Prof. Emilio Méndez
Director of the Center for Functional Nanomaterials (CFN) Brookhaven National Laboratory Upton, NY. USA

Prof. Héctor Abruña
Cornell University. USA

Prof. Carlos Bustamante
(until June 2104)
Howard Hughes Medical Institute University of California, Berkeley. USA

EXPERT TRUSTEES

Mr. Jerry B. Torrance
Consultant-advisor and expert in Technology Transfer in Nanoscience. State of California and the National Nanotechnology Initiative. USA

COMPANY TRUSTEES

Ramen, S.A
Mrs. Silvia Cristina López Mr. Emilio Ramiro

Tecnovac, S.A
Mr. César Atienza

Acciona
Mr. José Cubillo

GMV Aerospace and Defense SAU
Mr. Manuel Pérez

1.7. Scientific Advisory Committee

Prof. Héctor Abruña
Emile M. Chamot Professor. Cornell University. USA

Prof. Harald Brune
Director of the Institute of Nanostructures at Surfaces. Ecole Polytechnique Fédérale de Lausanne (EPFL). Switzerland

Prof. Luis Echegoyen
University of Texas at El Paso, USA

Prof. René A. J. Janssen
Eindhoven University of Technology Molecular Materials and Nanosystems. The Netherlands

Prof. Dr. Jürgen Kirschner
Director at the Max Planck Institut für Mikrostrukturphysik, Halle. Germany

Prof. Emilio Méndez
Director of the Center for Functional Nanomaterials (CFN). Brookhaven National Laboratory Upton, NY. USA

Prof. Maurizio Prato
Dipartimento di Science Farmaceutiche. Universita di Trieste. Italy

Prof. Rasmita Raval
Director of Surface Science Research Centre. University of Liverpool. United Kingdom

Prof. Ivan Schuller
Physics Department and California Institute of Telecommunication and Information Technology (Calit2) University of California-San Diego.USA

(since June 2014)

Prof. Dr. Johannes Barth
Molecular Nanoscience & Chemical Physics of Interfaces Department of Physics Technische Universität München, Germany

Prof. Yvan Bruynseraede
Department of Physics and Astronomy, University of Leuven, Belgium

Prof. Dr. Christoph Gerber
Director of Scientific Communication, NCCR Nanoscale Science Department of Physics University of Basel, Switzerland

Prof. Dirk M. Guldi
Associate Dean for Research - School of Science Department of Chemistry and Pharmacy Interdisciplinary Center for Molecular Materials (ICMM) Friedrich-Alexander-Universitaet Erlangen-Nuernberg

Prof. Dr. Ingrid Hilger
Head of the Department Experimental Radiology Institute of Diagnostic and Interventional Radiology I Universitätsklinikum Jena, Germany

(until June 2014)

Prof. Carlos Bustamante
Howard Hughes Medical Institute. Investigator Professor of Molecular and Cell Biology Physics, and Chemistry University of California, Berkeley. USA

Prof. Andreas Engel
Müller Institute, University of Basel Switzerland & Pharmacology Case Western Reserve University. USA

Prof. Michael Graetzel
Director Laboratory for Photonics and Interfaces (LPI) Ecole Polytechnique Fédérale de Lausanne (EPFL). Switzerland

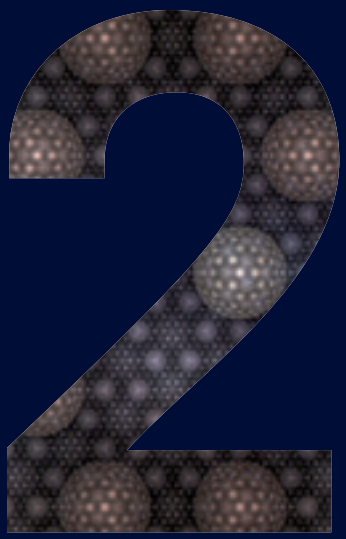
Prof. Atac Imamoglu
Institute of Quantum Electronics. ETH Zurich. Switzerland

Prof. Miquel Salmerón
Senior Staff Scientist and Principal Investigator Materials Science and EngineeringLawrence Berkeley National Laboratory

Prof. Niyazi Serdar Sariciftci
Director of Linz Institute for Organic Solar Cells (LIOS). Institute for Physical Chemistry Johannes Kepler University of Linz. Austria

Prof. Fred Wudl
Department of Chemistry and Biochemistry University of California, Santa Barbara

research programmes and scientists



annual report 2014

Programme 1

Molecular Nanoscience:

- Chemical Synthesis
- Time Resolved Optical Spectroscopy

Programme 2

Scanning Probe Microscopies and Surfaces

Programme 3

Nanomagnetism

Programme 4

Nanobiosystems: Biomachines and Manipulation of Macromolecules

Programme 5

Nanoelectronic and Superconductivity

Programme 6

Nanosurfaces and Nanodevices

Programme 7

Nanomedicine

programme 1
molecular nanoscience

This programme deals with the design and synthesis of molecular nanostructures and nanomateriales, 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, organometallic compounds and semiconducting quantum dots to self-organize on surfaces by means of covalent or supramolecular approaches and the implementation of various spectroscopic techniques, including spectroscopy on single molecules. Among the practical objectives of the Programme one may cite the optimization of organic solar cells and other functional organic devices.

Chemical Synthesis

Prof. Nazario Martín
Programme Manager
Double Affiliation: Universidad Complutense de Madrid, Spain

Nazario Martín (Madrid, 1956) is full professor of Organic Chemistry at the University Complutense of Madrid and vice-director of the Institute for Advanced Studies in Nanoscience of Madrid (IMDEA-Nanoscience). Recently he has been appointed as Dr. h.c. by La Havana University. Professor Martín's research interests span a range of targets with emphasis on the molecular and supramolecular chemistry of carbon nanostructures such as fullerenes, carbon nanotubes and graphenes, p-conjugated systems as molecular wires and electroactive molecules, in the context of electron transfer processes, photovoltaics applications and nanoscience. He has published over 450 papers in peer reviewed journals, given over 300 lectures in scientific meetings and research institutions, and supervised 29 theses. He has co-edited six books related with carbon nanostructures and he has been invited as guest editor for eight special issues in well-known international journals. Professor Martín has been visiting professor at UCSB and UCLA (California, USA) and Angers and Strasbourg (France) universities. He has served as a member of the Editorial Board of Chemical Communications, and he has served as General Editor of the Spanish journal Anales de Química (2000-2005) and as a member of the International Editorial Advisory Board of The Journal of Materials Chemistry (2000-2006). He is currently the Regional Editor for Europe of the journal Fullerenes, Nanotubes and Carbon Nanostructures and a member of the International Advisory Board of The Journal of Organic Chemistry and Accounts of Chemical Research(ACS), ChemSusChem,ChemPlusChem and Chemistry an Asian Journal (Wiley-VCH) and Chemical Society Reviews (RSC) and Chemical Communications (RSC). He is a member of the Royal Academy of Doctors of Spain as well as a fellow of The Royal Society of Chemistry. In 2006-2012 he has been the President of the Spanish Royal Society of Chemistry. He has been the recipient of the "Dupont Prize of Science" in 2007 and of the "Gold Medal and Research Award" in 2012, the highest distinction given by the Spanish Royal Society of Chemistry. He has recently appointed with the national "Jaime I Award for basic research" 2012. He is the last chemist distinguished with the "EuCheMS Lecture Award" in 2012. More recently, he has received two prestigious international prizes, namely the Alexander von Humboldt Award (Germany) and the Richard E. Smalley Award de la Electrochemical Society (USA).

Relevant publications

- "Switching the Stereoselectivity: (Fullero)Pyrrolidines "a la Carte", E. E. Marot et col. *J. Am. Chem. Soc.*, 2012, **134**, 12936-12938
- "Tetrathiafulvalene-Based Nanotweezers—Noncovalent Binding of Carbon Nanotubes in Aqueous Media with Charge Transfer Implications" C. Romero-Nieto et col. *J. Am. Chem. Soc.*, 2012, **134**, 9183-9192.
- "Concave versus Planar Geometries for the Hierarchical Organization of Mesoscopic 3D Helical Fibers" J. L. López et col. *Angew. Chem. Int. Ed.* 2012, **51**, 3857-3861

Supramolecular Chemistry and Self-Assembly of Functional Materials

Dr. Emilio Pérez

Senior Researcher

Ph.D.: University of Edinburgh, UK

Previous Position: Universidad Complutense de Madrid. Spain

Emilio M. Pérez obtained his BSc (2000) and MSc (2001) from the Universidad de Salamanca. He then joined the group of Prof. David A. Leigh at the University of Edinburgh (UK) where he obtained his PhD in 2005. His PhD work was recognized with the 1st Prize at the 2004 Society of Chemical Industry Symposium on Novel Organic Chemistry and the 2006 IUPAC Prize for Young Chemists, distinguishing it as one of the top five PhD theses in the Chemical Sciences worldwide. He joined the group of Prof. Nazario Martín at the Universidad Complutense de Madrid in 2005. In December 2008 he joined IMDEA Nanoscience as a Ramón y Cajal researcher. During his stay in Madrid, he has received the 2009 Real Sociedad Española de Química Prize for Novel Researchers, the 2010 Universidad Complutense de Madrid Foundation Prize for Science and Technology, and the 2013 Ramón Catalán Prize for Scientists < 40 y.o.

In 2011-2012 he received support from both Spanish (MINECO) and European sources (ERC Starting Independent Research Grant) to establish his own research group at IMDEA, where he holds a Senior Researcher position, leading a group currently formed by 6 PhD students, 2 postdocs and 1 senior technician. His main research interests concern the development of unconventional methods for the modification of carbon nanotubes, molecular recognition, the self-assembly of functional materials and the construction of molecular machinery.

Research lines

- Synthesis of organic molecular materials
- Molecular recognition of carbon nanostructures
- Supramolecular chemistry
- Self-assembly of functional materials

Relevant publications

- "Pyrene-based mechanically interlocked SWNTs" A López-Moreno and E M Pérez Chem.Commun. *2015, doi: 10.1039/C4CC08970G.*
- "Mechanically Interlocked Single Wall Carbon Nanotubes" A de Juan et col. *Angew. Chem. Int. Ed.*2014, **53**, 5394-5400
- "High Degree of Polymerization in a Fullerene-containing Supramolecular Polymer" H Isla, E M Pérez and N Martín. *Angew. Chem. Int. Ed.*2014, **53**, 5629-5633

Dr. María del Mar Bernal

Postdoc

Italian Institute of Technology (IIT)-Nanophysics Facility, Genova,Italy

Dr. Emerson Giovanelli

Postdoc

Ecole Supérieure de Physique et de Chimie Industrielles de la Ville de Paris (ESPCI ParisTech), France

Dr. Atena Naemi

Visiting Researcher

Universidad de Jiroft, Iran

Alberto de Juan

Ph.D. student

Alejandro López

Ph.D. student

Sofía Leret

Ph.D. student

Leyre de Juan

Ph.D. student

Teresa Naranjo

Ph.D. student

Delphine Canion

Internship (Institute of Technology Bordeaux University, France) (April 2014-June 2014)

María González

Internship

Design and Synthesis of Molecular Nanostructures and Nanomaterials

Dr. Juan Luis Delgado

Senior Researcher

Ph.D.: Universidad de Castilla-La Mancha, Spain

Previous Position: Universidad Complutense de Madrid. Spain

Juan Luis Delgado obtained his PhD (2004) from the Universidad de Castilla-la Mancha (Spain). Afterwards he joined the group of Prof. Jean-François Nierengarten, at the ECPM-CNRS (Strasbourg, France) where he worked as a postdoctoral fellow (2005-2006). He then joined the group of Prof. Nazario Martín in December 2006 as a "Juan de la Cierva" postdoctoral fellow. Currently he is a Senior Researcher at IMDEA-Nanoscience, where he is focused on the design of carbon-based energy storing materials for the development of organic photovoltaic devices. He is co-author of 60 scientific papers and book chapters and in 2013 he has been awarded with the" Young researcher award" of RSEQ-Lilly Spain and the "Emerging Investigator award" of RSEQ-Sigma Aldrich Spain.

Research lines

- Improvement of the performance of Bulk Hetero Junction (BHJ) Solar Cells. We are focused on the synthesis of new donor and acceptor light harvesting materials in order to prepare more efficient solar cells.
- Synthesis of new organic dyes, based on donor-acceptor systems, to prepare new efficient Dye Sensitized Solar Cells (DSSC).
- Synthesis of donor-acceptor and donor-acceptor-acceptor systems, to study the electron transfer events that take place on these systems.

Relevant publications

- "Efficient Electron Transfer and Sensitizer Regeneration in Stable piExtended Tetrathiafulvalene-Sensitized Solar Cells" Wenger S. et col. *J. Am. Chem. Soc., 2010,* ***132****, 5164-5169*
- "Synthesis, Photochemistry, and Electrochemistry of Single-Wall Carbon Nanotubes with Pendent Pyridyl Groups and of their Metal Complexes with Zinc Porphyrin. Comparison with Pyridyl-Bearing Fullerenes" Alvaro M. et col. *J. Am. Chem. Soc.,* 2006, **128,** 6626-6635
- "Infrared Photocurrent Spectral Response from Plastic Solar Cell with Low-Band-Gap Polyfluorene and Fullerene Derivative" Wang J et col. *Appl. Phys. Lett.* **85**, 5081 (4pp) (2004)

Dr. Agustín Molina

Postdoc

University of Texas at El Paso, USA

Dr. José Santos

Postdoc

Durham University, UK

Inés García

Ph.D. student

Rosa María Girón

Ph.D. student

Valentina Sacchetti

Ph.D. student (Università degli Studi dell'Aquila, Italy)

Rafael Sandoval

Ph.D. student

Organic Functional Materials

Prof. Tomás Torres

Associated Senior Scientist
Ph.D.: Universidad Autónoma de Madrid, Spain
Double Affiliation: Universidad Autónoma de Madrid, Spain

Tomás Torres is Full Professor of Organic Chemistry at the Autónoma University of Madrid (UAM) and Associated Senior Researcher at the IMDEA-Nanoscience.

In addition to various aspects of synthetic and supramolecular chemistry his current research interests include the preparation and study of photophysical properties of organic functional materials. His group, that presently consists of twenty five researchers, is currently exploring several areas of application of phthalocyanines, porphyrins and carbon nanostructures (fullerenes, carbon nanotubes, graphene), including organic and hybrid solar cells, with a focus on nanotechnology.

Prof. Torres has published more than 420 papers and 41 patents, has given more than 250 lectures in scientific meetings and research institutions, and supervised 34 PhD. theses. He has an H-factor of 64 (ISI Web of Knowledge).

In 2001 he was distinguished as a Visiting Fellow of the Japan Society for the promotion of Science (JSPS). He has been awarded the JANSSEN CILAG prize for Organic Chemistry 2005. In 2009, he has also been honoured as Doctor Honoris Causa by the Ivanovo State University of Chemistry and Technology (ISUCT), Russia. Director of the International Research Laboratory in Nanoscience (IRLoN), Ivanovo, Rusia, 2013. Research Award and Gold Medal of the Royal Society of Chemistry of Spain, 2013. Fellow of the Royal Society of Chemistry (FRSC), 2014.

Research lines

- In addition to various aspects of synthetic and supramolecular chemistry his current research interests include the preparation and study of photophysical properties of organic functional materials. His group is currently exploring several areas of application of phthalocyanines, porphyrins and carbon nanostructures (carbon nanotubes, graphene), including organic and hybrid solar cells, with a focus on nanotechnology.

Relevant publications

- "Efficient Electron Transfer and Sensitizer Regeneration in Stable piExtended Tetrathiafulvalene-Sensitized Solar Cells" Wenger S. et col. *J. Am. Chem. Soc.*, 2010, **132**, 5164-5169
- "Synthesis, Photochemistry, and Electrochemistry of Single-Wall Carbon Nanotubes with Pendent Pyridyl Groups and of their Metal Complexes with Zinc Porphyrin. Comparison with Pyridyl-Bearing Fullerenes" Alvaro M. et col. *J. Am. Chem. Soc.*, 2006, **128**, 6626-6635
- "Infrared Photocurrent Spectral Response from Plastic Solar Cell with Low-Band-Gap Polyfluorene and Fullerene Derivative" Wang J et col. *Appl. Phys. Lett.* **85**, 5081 (4pp) (2004)

Developing Biosensors based on Nanomaterials

Prof. María Encarnación Lorenzo

Associated Senior Scientist
Ph.D.: Universidad Autónoma de Madrid, Spain
Double Affiliation: Universidad Autónoma de Madrid, Spain

María Encarnación Lorenzo graduated in Analytical Chemistry in 1979 at the Universidad Autónoma de Madrid (UAM). She received her PhD in 1985 at the same University and then moved to the University of Dublin and the University of Cornell (USA). She is currently full professor of Analytical Chemistry at the University Autónoma of Madrid and the coordinator of Sensorand Biosensors Group Professor Lorenzo's research interests is focused on the developed very selective bio-sensors for rapid determination of important analytes.

Research lines

- Interaction of (Bio)molecules with nanomaterials: Characterization and properties.
- Use of nanomaterial in the development of improved bioanalytical devices.
- Surface Science: Characterization of biological nanomaterials immobilized on metallic surfaces.
- Development of nanoscale oscillators to design optoelectronic materials for optical data storage media, photochemical energy conversion and for bioelectronic applications.

Relevant publications

- "Diamond Nanoparticles Based Biosensors for Efficient Glucose and Lactate Determination" . M. Brionesa et col. *Biosensors & Bioelectronics* **68C** (2015) 521-528.
- "Glutathione Immunosensing Platform Based on Total Internal Reflection Ellipsometry Enhanced by Functionalized Gold Nanoparticles" Antonio García-Marín et col. *Anal. Chem.* **85**, 4969–4976 (2014)
- "Electrochemically Generated Nanoparticles of Halogen-Bridged Mixed-Valence Binuclear Metal Complex Chains" Emiliano Martinez-Periñan et col. *Chem. Eur. J.* 2014, **20**, 7107–7115

Electrochemical Sensors and Biosensors

Prof. José Manuel Pingarrón

Associated Senior Scientist
Ph.D.: Universidad Complutense de Madrid, Spain
Double Affiliation: Universidad Complutense de Madrid, Spain

José M. Pingarrón obtained his Ph.D. (1981) from Complutense University of Madrid. Between 1982 and 1983, he did postdoctoral training at the École Nationale Supérieure de Chimie de Paris. Since 1994, he is a full Professor of Analytical Chemistry at the Complutense University of Madrid. José M. Pingarrón headed the Department of Analytical Chemistry at the Faculty of Chemistry between 1998 and 2006 and he was the President of the Spanish Society of Analytical Chemistry between 1998 and 2001. Professor Pingarrón is the recipient of the Faculty of Chemistry Medal, the Complutense University of Madrid Medal and the 2012 research award on Analytical Chemistry of the Spanish Royal Society of Chemistry. He is author or co-author of 289 peer-reviewed papers, 23 book chapters and 2 text books as well as 6 invention patents. He is currently Vice-President of the Spanish Royal Society of Chemistry and is its representative in the Division of Analytical Chemistry of the European Association for Chemical and Molecular Sciences. Professor Pingarrón is Associate Editor of Electroanalysis Journal and belongs (or belonged) to the Editorial Advisory Boards of the Journal of Electroanalytical Chemistry, Talanta, Analyst, Chemical Sensors and ChemElectroChem and Member of the Analytical Chemistry Division Committee of IUPAC. Moreover, Professor Pingarrón is co-founder of the "spin-off" company Inbea Biosensores S.L.

Research lines

- His research interests focus on analytical electrochemistry, nanostructured electrochemical interfaces, nanomaterials and electrochemical sensors and biosensors.

Relevant Publications

- "Towards the Design of Smart Delivery Systems Controlled by Integrated Enzyme-Based Biocomputing Ensembles". P. Díez et col. *J. Am. Chem. Soc.*, 2014, **136**, 911-9123
- "Magnetobiosensors Based on Viral Protein P19 for Microrna Determination in Cancer Cells and Tissues". S. Campuzano et col. *Angew. Chem. Int. Ed.* 2014, **53**, 6168-6171
- "Carbon Nanohorns as Scaffold for the Construction of Disposable Electrochemical Immunosensing Platforms. Application to the Determination of Fibrinogen in Human Plasma and Urine". I. Ojeda et col. *Anal. Chem.* **86**, 7749-7756 (2014)

Hybrid Systems based on Semiconductor Nanoparticles

Dr. Beatriz H. Juárez

Associated Scientist
Ph.D.: Universidad Autónoma de Madrid, Spain
Double Affiliation: Universidad Autónoma de Madrid, Spain

Beatriz Hernández Juárez is associated professor at the Universidad Autónoma de Madrid (from Sep.12) and former researcher in the "Ramón y Cajal" programme at IMDEA Nanoscience. She received a B.Sc. degree in Chemistry from the Universidad Complutense de Madrid (UCM) in 1999 and a Ph.D degree in Material Sciences from the Universidad Autónoma de Madrid (UAM) in 2005 with a work on Photonic Crystals supervised by Prof. C. López. Dr. Hernández also worked for almost 2 years in Lucent Technology, a factory devoted to the fabrication of microelectronic circuits in a clean room laboratory. After finishing the PhD, she moved to the Laboratoire de Photonique Quantique et Moléculaire (LPQM) in Paris. After a short stay, she joined the group of Prof. Dr. Horst Weller in Hamburg (http://www.chemie.unihamburg.de/pc/weller/index.html) with a Marie Curie Individual Intra European Fellowship.

Research lines

- Studies about the interactions between carbon nanotubes or graphitic surfaces and semiconductor nanoparticles. Synthesis, analytical, electrochemical and microscopical characterization.
- Composites based on carbon fibers for mechanical and electrical aims.
- Synthesis and optical characterization of hybrid systems composed of semiconductor and metallic nanoparticles.
- Quantum dots in photonic crystals.

Relevant publications

- "Effect of Chloride Ligands on CdSe Nanocrystals by Cyclic Voltammetry and X-ray Photoelectron Spectroscopy" Leonor de la Cueva et col. *J. Phys. Chem. C*, 2014, **118**, pp 4998–5004
- "Interfacing Quantum Dots and Graphitic Surfaces with Cl-based Atomic Ligands" F. Iacono et col. *ACS Nano*, 2013, **7**, pp 2559–2565
- "Plasmon-exciton Interactions on Single Photoresponsive Platforms Demonstrated by Optical Tweezers." S. Hormeño et col. *Nano Lett.*, 2007, **11**, 4742–4747

María Acebrón
Ph.D. student

Carlos de Lucas
Master student

Jesús Barrio
Master student

Héctor Rodríguez
internship

Javier Domínguez
Internship

Designed Functional Nanomaterials

Dr. Félix Zamora

Associated Scientist

Ph.D.: Universidad Autónoma de Madrid, Spain

Double Affiliation: Universidad Autónoma de Madrid, Spain

Félix Zamora received his PhD from the Universidad Autónoma de Madrid (Spain) in 1994 to 1996 he worked at University of Dortmund (Germany) as a postdoctoral HCM EU fellowship. He was visiting professor at Virginia University (USA), New Castle University (UK) and National Singapore University (Singapore). From 2002, he is ''Profesor Titular'' at the Inorganic Chemistry Department at the Universidad Autónoma de Madrid, and associate research at IMDEA Nanoscience. His research group (www.nanomater.es) is mainly focused in the production of functional nanomaterials. He is co-author of more than 100 papers in international first line journals (including Nature Nanotech., Nature Commun., Chem.Soc.Rev. Angew. Chem., JACS, Chem.Sci., Adv. Mater., ACS Nano,...) and member of the Editorial Board of Scientific Reports (Nature Publishing Group). He is co-founder and scientific assessor of the company Nanoinnova Technologies (spin-off UAM company, www.nanoinnova.com) a company devoted with the commercialization of nanomaterials and devices useful at the nanoscale.

Research lines

- His current research is focused on the synthesis of novel nanomaterials using several strategies based on metal modified DNA, coordination and MMX polymers, and carbon based materials (graphene, CNT and carbon nitrides). His research group is pioneer in the developing of new adsorption methods of MMX and coordination polymers which are suitable for study properties at the nanoscale. They have developed a new source of graphene alternative 2D polymers based on MOFs and COFs. The group has a large list of collaborators all over the world, and some inter- national companies (Abengoa Res., Intel Co., Nanotech Electrónica,...).

Relevant publications

- "Intrinsic Electrical Conductivity of Nanostructured Metal-Organic Polymer Chains" C. Hermosa et col. *Nature Commun.* **4**, 1709-1714 (2013)
- "Solvent-Induced Delamination of a Multifunctional Two Dimensional Coordination" A. Gallego et col. *Adv. Matter.* 2013, **25**, 2141–2146
- "Electrical Conductive Coordination Polymers" G. Givaja et col. *Chem. Soc. Rev.* 2012, **41**, 115–147

Mohammadreza Azani

PhD. student

David Rodríguez

PhD. student

Javier Conesa

Internship

Marta Cortés

Internship

Synthesis and Study of Porphyrinoid-based Covalent and Supramolecular Ensembles

Dr. Giovanni Bottari

Associated Scientist

Ph.D.: University of Edinburgh, United Kingdom

Double Affiliation: Universidad Autónoma de Madrid, Spain

Giovanni Bottari graduated in Chemistry (*cum laude*) from the Universitá degli Studi di Messina, Italy, in 1999, and received his Ph.D. in Chemistry from the University of Edinburgh, United Kingdom, in 2003 with a work on stimuli-responsive interlocked molecular architectures supervised by Prof. David A. Leigh. In 2004, he was awarded with a two-year Individual Intra European Marie Curie fellowship which he realized in the group of Prof. Tomás Torres at the Universidad Autónoma de Madrid (UAM). In 2006, he was the recipient of a tenure-track "Ramón y Cajal" contract and since 2011 he is Associate Professor in the department of Organic Chemistry at UAM.

Research lines

- In addition to various aspects of synthetic and supramolecular chemistry, the current research interests of Dr. Bottari include the synthesis and study of covalent and supramolecular systems based on phthalocyanines and electroactive units (empty and endohedral fullerenes, carbon nanotubes, and corannulenes, among others) as well as their self-organization both in solution and on surfaces. He is also interested in the preparation of novel polarity- and viscosity-responsive fluorescent molecular rotors for biological and materials science applications.

Relevant publications

- "A Voyage into The Synthesis and Photophysics of Homo- and Heterobinuclear Ensembles of Phthalocyanines and Porphyrins", G. de la Torre et col. *Chem. Soc. Rev.*, 2013, **42**, 8049-8105
- "Ultrasound-induced Transformation of Fluorescent Organic Nanoparticles from a Molecular Rotor into Rhomboidal Nanocrystals with Enhanced Emission", M. Koenig et col. *Chem. Commun.*, 2014, **50**, 12955-12958
- "Organic Nanomaterials: Synthesis, Characterization, and Device Applications", Editors: Tomás Torres and Giovanni Bottari, John Wiley & Sons, Inc., *Hoboken, New Jersey,* 2013, ISBN: 978-1-118-01601-5

Nanosensors & Nanomachines

Dr. Reynaldo Villalonga

Associated Scientist
Ph.D.: Havana University, Cuba
Double Affiliation: Universidad Complutense de Madrid, Spain

Reynaldo Villalonga obtained his PhD in Chemistry (2001) from Havana University (Cuba), working in the development of new approaches for the synthesis of neoglycoenzymes. He was full professor of Organic Chemistry and founding director of the Center for Enzyme Technology at the University of Matanzas, Cuba (2005-2009). He was visiting professor at Toyama Prefectural University (Japan), McGill University (Canada), Firenze University (Italy) and Joseph Fourier University of Grenoble (France). Currently he holds a Ramón y Cajal research contract at Complutense University of Madrid, and he is associate researcher at IMDEA-Nanosciences. He was appointed as National Representative (2010-2011) and current fellow of IUPAC. He was awarded with the Development Cooperation Prize of Belgium in 2001. He is cofounder and scientific advisor of Orion High Technologies S.L., a company devoted to the design and commercialization of functional nanomaterials and nanohybrids, and nanomaterials-based biosensors. Dr. Villalonga has published over 120 research paper and chapter books.

Research lines

- Hybrid nanomaterials and nanostructured surfaces for biosensor design
- Enzyme-controlled nanomachines for drug delivery
- Anisotropic nanoparticles
- Mesoporous materials

Relevant publications

- "Towards the Design of Smart Delivery Systems Controlled by Integrated Enzyme-Based Biocomputing Ensembles" P. Díez et col. *J. Am. Chem. Soc.*, 2014, **136**, 9116-9123
- "Neoglycoenzymes" R. Villalonga et col. *Chem. Rev.* 2014, **114**: 4868-4917
- "Nanochannel-Based Electrochemical Assay for Transglutaminase Activity" I. Fernández et col. *Chem. Commun.*, 2014, **50**, 13356-13358

Time resolved Optical Spectroscopy

Optical Spectroscopy of Polyconjugated Materials

Dr. Johannes Gierschner

Senior Researcher
Ph.D.: University of Tübingen, Germany
Previous Position: University of Mons, Belgium

Johannes Gierschner received his PhD in 2000 in Tübingen (Germany), followed by a position as researcher, lecturer, and institute manager in equal shares. In 2004 he moved to Mons (Belgium) with D. Beljonne & J. Cornil, including a 4-month stay with J.-L. Brédas at GeorgiaTech. In 2008 he became Ramón y Cajal research fellow and Senior Researcher at IMDEA Nanoscience. He was visiting researcher in Valencia (2008-10) and holds visiting professor positions in Tübingen (Germany), Mons (Belgium) and Seoul National University (Korea). JG has coordinated National and European projects and has published more than 80 peer reviewed papers (2900 cites, h = 30).

Research lines

- JG's work integrates steady-state and time-resolved optical spectroscopy with quantum-chemical methods to achieve an in-depth understanding of the sig- natures and fates of excitons in organic materials for optoelectronic applications, with special focus on environmental effects in polymers (including aggregation, disorder, temperature, etc), single crystals of structurally well-defined oligomers and supramolecular nanostructured multi-chromophore systems

Relevant publications

- "Luminescent Distyrylbenzenes: Tailoring Molecular Structure and Crystalline Morphology" J. Gierschner, S. Y. Park, *J. Mater. Chem. C, 2013, 1, 5818–5832*
- "Computational Engineering of Low Bandgap Copolymers" M. Wykes, B. Milán Medina, J. Gierschner *Front. Chem.* 1, **35** (2013)
- "Highly Emissive H-Aggregates or Aggregation-Induced Emission Quenching? The Photophysics of All-Trans Para-Distyrylbenzene" J. Gierschner et col. *J. Phys. Chem. Lett.*, 2013, **4**, pp 2686-2697

Dr. Shinto Varghese

Postdoc
National Institute for Interdisciplinary Science and Technology, Kerala, India

Dr. Mike Wykes

Postdoc
Cambridge Display Technology, UK

Dr. Santanu Bhattacharyya

Postdoc
Indian Association for the Cultivation of Science, Kolkata, India

Dr. Begoña Milian

Visiting Researcher
Universidad de Valencia, Spain

Shi Junquing

PhD. student
(Beijing Normal University, China)

Benedikt Dänekamp

Visiting Master student
(Humboldt-Universität zu Berlina, Germany) (October 2014-April 2015)

Rameesha Mangattu Parambil

Visiting Master student
(MES Ponnani College, Kerala, India) (April 2014-June 2014)

Nanooptics and Nanoacoustics

Dr. Reinhold Wannemacher

Senior Researcher
Ph.D: University of Darmstadt, Germany
Previous Position: University of Leipzig, Germany

Reinhold Wannemacher received his doctoral degree from Technische Universität Darmstadt and his "Habilitation" from Johann Wolfgang Goethe-Universität, Frankfurt, Germany. His scientific work in the areas of Optics and Acoustics was partly performed at The University of Georgia, IBM Almaden Research Laboratory, and Rijksuniversiteit Leiden. He has been a Guest Professor for Nano-Optics at Technische Universität Chemnitz, as well as a member of the Faculty of Physics and Geosciences of the University of Leipzig. He is the author of about 70 scientific articles.

Research lines

- Nano-Optics. Optical microscopy in the near and far field. Optical spectroscopy, including coherent and nonlinear techniques, such as pump-probe, optical coherent transients, spectral hole-burning, optical-magnetic double resonance, up-conversion. Raman and FTIR spectroscopy. Mie scattering. Phase-sensitive acoustic microscopy, imaging, and non-destructive testing

Relevant publications

- "Stimulated Resonance Raman Scattering and Laser Oscillation in Highly Emissive Distyrylbenzene-Based Molecular Crystals" S. Varghese et col. *Adv. Mat.* 2012, **24**, 6473-6478
- "Plasmon-Supported Transmission of Light through Nanometric Holes in Conductive Screens" R. Wannemacher *Opt. Commun.* **195**, 107-118 (2001)
- "Failure of Local Mie Theory: Optical Properties of Colloidal Aggregates" Pack, M. et col. *Opt. Commun.* **194**, 277-287 (2001)

Dr. Daniel Cano

Postdoc
Eberhard-Karls-Universit¨at T¨ubingen, Germany

Femtosecond Spectroscopy on Molecular Systems

Dr. Larry Luer

Senior Researcher
Ph.D.: University of Tübingen, Germany
Previous Position: Politecnico di Milano, Italy

Larry Luer (born in Leutkirch / Germany in 1965) received his PhD at the University of Tübingen in 2001, studying the photoconductivity of organic conjugated molecules. In 2001/2002, he held a Marie Curie Individual fellowship at Politecnico di Milano in the group of Guglielmo Lanzani, investigating ultrafast charge carrier generation in organic conju- gated molecules. From 2003-2009, he was senior researcher at Politecnico di Milano, focused on ultrafast events in low dimensional conjugated materials, such as carbon nanotubes and purple bacterial light harvesting systems. Since 2009, he is Senior researcher at IMDEA Nanociencia. He has coordinated the Marie Curie Network "BIMORE" and is now coordinator of the Marie Curie Network "POCAONTAS" and member of the Marie Curie Network "ESTABLIS".

Research lines

- Vectorial energy transfer in purple bacterial light harvesting systems
- Ultrafast charge and energy transfer in Carbon nanotubes
- Environmental stability of organic photovoltaic systems
- Photophysical characterization of novel materials for organic photovoltaics.

Relevant publications

- "Free-Carrier Generation In Semiconducting Single-Wall Carbon Nanotube Aggregates" J. J. Crochet et col. *Phys. Rev. Lett.* **107**, 257402 (5pp) (2011)
- "Photodegradation of P3HT - a systematic study of environmental factors", H. Hintz et col. *Chem. Mater.* 2011, **23**, pp145-154
- "Low Light Adaptation: Energy Transfer Processes in Different Types of Light Harvesting Complexes from *Rhodopseudomonas palustris*" V. Moulisova et col. *Biophys. J.* 2009, **97**, 3019-3028

Safakath Karuthedath

Ph.D. student
(National Institute of Technology, Calicut, India)

Abasi Abudulimu

Ph.D. student
(Umeå University, Sweden)

Anna Isakoba

Visiting Ph.D. student
(Aston University, UK) (May 2014 -December 2014)

Pump Probe and Photoinduced Absoption Spectroscopies

Dr. Juan Cabanillas-González

Researcher

Ph.D.: Imperial College London, UK

Previous Position: Politecnico di Milano, Italy

Juan Cabanillas González got a degree in Physics at Universidade de Santiago de Compostela in 1999. In 2004 he completed a PhD at Imperial College London working with photophysics of -conjugated polymer-based blends for photovoltaic applications. Between 2003-2006 he worked as post-doc at Politecnico di Milano with electric field assisted pump-probe spectroscopy. Between 2006-2009 he held a research fellowship to investigate the use of electromodulated spectroscopy coupled to confocal microscopy for charge density mapping in organic planar photodetectors. Since 2009 he is Ramon y Cajal researcher at IMDEA Nanociencia.

Research lines

- Processes: Charge generation/recombination, charge transport, exciton dynamics, optical gain, morphology.
- Materials: ϖ-conjugated polymers and oligomers, hybrid inorganic-organic semiconductors, colloidal semiconductors.
- Techniques: Time-resolved spectroscopy (pump–probe, transient absorption, time resolved fluorescence), electromodulated spectroscopy (CW and transient Stark), OLED and solar cell characterization, optical gain characterization.

Relevant publication

- "Role of Amorphous and Aggregate Phases on Field-Induced Exciton Dissociation in a Conjugated Polymer", Marta M. Mróz et col. *Phys. Review B* **87**, 035201 (11pp) (2013)
- "Pump-Probe Spectroscopy in Organic Semiconductors: Monitoring Fundamental Processes of Relevance in Optoelectronics" J. Cabanillas-Gonzalez et col. *Adv. Mat.* 2011, **23**, 5468-5485
- "Photoinduced Transient Stark Spectroscopy in Organic Semiconductors: a Method for Charge Mobility Determination in the Picosecond Regime", J. Cabanillas-Gonzalez et col. *Phys. Rev. Lett.* **96**, 106601 (4pp) (2006)

Dr. Marta Magdalena Mroz

Postdoc

Politecnico di Milano, Italy

Longfei Wu

Ph.D. student

(Beijing Normal University, China)

Giulin Liu

Visiting Ph.D. student

(Jiangnan University, China)

(September 2014-)

Qi Wei

Visiting Master student

(Nanjing University, China)

(March 2014 -August 2014)

Ramón Barato

Internship

programme 2
scanning probe microscopies and surfaces

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 advanced Scanning Probe Microscopes, mostly STM, AFM and Photoelectron Microscopy to investigate problems such as the epitaxial growth of graphene, the self- assembly of molecules at surfaces, the realization of inelastic spectroscopy at the level of single molecules 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 and energy applications and closely interact with the ones of Programmes 1 and 3.

Prof. Rodolfo Miranda

Programme Manager

Double Affiliation: Universidad Autónoma de Madrid, Spain

Rodolfo Miranda got his Ph.D in Physics from the Universidad Autónoma de Madrid (UAM) in 1981 for a work on the role of defects on surfaces under the supervision of Prof. J.M. Rojo. He worked in Munich and Berlin with Gerhard Ertl (NL in Chemistry 2007), before being appointed Full Professor of Condensed Matter Physics at the UAM in 1990. Prof. Miranda has been Vice-chancellor of Research and Scientific Policy (1998-2002) of the UAM, Executive Secretary of the R+D Commission of the Conference of Rectors of Spanish Universities (CRUE) (2000-2002) and Director of the Materials Science Institute "Nicolás Cabrera". He has served on Advisory Committees for different institutions, such as the Surface Science Division of IUVSTA, the Max Planck Institute für Mikrostruktur Physik or the European Synchrotron Radiation Facility (ESRF). Prof. Miranda is Fellow of the American Physical Society since 2007, Head of the Surface Science Lab of the UAM (LASUAM) and Director of the Madrid Institute for Advanced Studies in Nanoscience (IMDEA-Nanociencia) from February 2007.

Prof. Miranda´s research interests range from low dimensional magnetism or molecular self-organization on surfaces to the mechanisms of epitaxial growth, the growth and properties of graphene or the use of magnetic nanoparticles in nanomedicine. Together with his collaborators, has developed instruments to perform Scanning Tunnelling Microscopy (STM), Helium Atom Scattering (HAS) or Angular Resolved Photoemission (ARUPS) in Ultra High Vacuum conditions. Professor Miranda has authored and coauthored more than 270 scientific publications, which have received nearly 8.000 citations. He has supervised more than 40 Ph. Ds and postdoctoral researchers.

Relevant publications

- "Long Range Magnetic Order in a Purely Organic 2D Layer Adsorbed on Epitaxial Graphene" M. Garnica et col. *Nature Physics* **9**, 368-374 (2013).
- "Periodically rippled Graphene: Growth and Spatially Resolved Electronic Structure". A.L. Vazquez de Parga et col. *Phys. Rev. Lett.* **100**, 056807 (7pp) (2008)
- "Curie Temperature of Ultrathin Films of fcc-Cobalt Epitaxially Grown on Atomically Flat Cu(100) Surface" C.M. Schneider et col. *Phys. Rev. Lett.* **64**, 1059 (4pp) (1990)

Nanotribology

Dr. Enrico Gnecco

Senior Researcher

Ph.D.: University of Genoa, Italy
Previous Position: University of Basel, Switzerland

Enrico Gnecco received his PhD in Physics from the University of Genoa in 2001, and worked several years at the University of Basel before joining IMDEA Nanociencia in 2010. Among other topics, he investigated atomic-scale friction of metal, insulating and semiconducting surfaces in ultra-high vacuum, the onset of abrasive wear on crystal surfaces on the nanoscale, the transition from stick- slip to superlubricity, the phononic and electronic contributions to dissipation in close proximity to solid surfaces, and the confinement of organic molecules on insulating surfaces caused by artificial nanostructures. Enrico Gnecco co-authored about 80 peer-reviewed articles (including publications in Science, Nature Materials, PNAS and Nanoletters) and 4 book chapters. He also wrote the book "Nanoscale Processes on Insulating Surfaces" (World Scientific, 2009) with Marek Szymonski, and edited the book "Fundamentals of Friction and Wear on the Nanoscale" (Springer, 2007 and 2014) with Ernst Meyer. Last but not least, he was awarded a diploma in piano from the Conservatory of Music of his hometown, Genoa.

Research lines

- At IMDEA Nanociencia Prof. Gnecco is leading the nanotribology group, focusing on friction, adhesion and wear processes on the nanometer scale. Both experimental (atomic force microscopy and related techniques) and theoretical (analytical models based on classical mechanics and reaction rate theory) approaches are explored. Our current research topics are friction in liquid environments, nanomanipulation of organic molecules, and nanostructuring of polymers caused by viscoplastic deformations. The ultimate goal of his work is to control friction and particle manipulation at the nanoscale.

Relevant Publications:

- "Quantifying the Atomic-level Mechanics of single Long Physisorbed Molecular Chains" S. Kawai et col. *Proc. Natl. Acad. Sci. USA* **111** 3968–3972 (2014)
- "Suppression of Electronic Friction on Nb Films in the Superconducting State" M. Kisiel et col. *Nature Materials* **10**, 119-122 (2011)
- "Atomic-scale Control of Friction by Actuation of Nanometer-sized contacts" Socoliuc A. et col. *Science* **313**, 207-210 (2006)

Dr. Pawel Nita

Postdoc

Maria Curie-Sklodowska University, Lublin, Poland

Patricia Pedraz

Ph.D. student

Optical Properties of Semiconducting Nanostructures

Dr. Daniel Granados

Senior Researcher

Ph.D.: Universidad Autónoma de Madrid. Spain.
Previous Position: Toshiba Research Europe Ltd. (TREL), Cambridge, UK

Daniel Granados worked as Ph.D. student at the group of molecular beam epitaxy of IMM-CNM-CSIC, on the growth and characterisation of III-V semiconductor Nanostructures. For six months he was an invited researcher at the Nano-Optics group of the Heriott-Watt University in Edinburgh (Scotland), working on single Quantum dot optical characterisation. After this, Dr. Granados joined the Quantum Information Group of Toshiba Research Europe Ltd in Cambridge (UK), as a research scientist; working on photon confinement and cavity quantum electrodynamics. He joined IMDEA Nanoscience in September 2009. Since January 2014 he is Senior Scientist and Ramon y Cajal fellow

Research lines

- My research interests are the micro and nanofabrication of electronic and photonic devices for photonics, nano-optics and quantum information processing, as well as the growth, characterisation and technologies based on graphene and other 2D materials. Recently, I have started to work on near field optical characterisation and optical Scanning tunnelling microscopy.

Relevant publications

- "Local Characterization of the Optical Properties of Annealed Au Films on Glass Substrates" R. Bernardo-Gavito et col. *J. Appl. Phys.* **114**, 164312 (5pp) (2013)
- "Oscillatory Persistent Currents in Self-Assembled Quantum Rings" Kleemans, Najm et col. *Phys. Rev. Lett.* **99**, 146808 (3pp) (2007)
- "Manipulating Exciton Fine Structure in Quantum Dots with a Lateral Electric Field" Gerardot, BD et col. *Appl. Phys. Lett.* **90**, 041101 (3pp) (2007)

Ramón Bernardo

Ph.D. student

Spin-Polarized STM

Dr. Fabián Calleja

Researcher

Ph.D.: Universidad Autónoma de Madrid, Spain

Previous Position: École Polytechnique Fédérale de Lausanne (EPFL), Switzerland

Fabian Calleja got his PhD from the Universidad Autónoma de Madrid (UAM, Spain) in 2007, developing a variable temperature STM system and studying subjects such as the interpretation of atomic resolution STM images acquired on metal oxide surfaces, the quantum size effects in the thermal stability of atomically flat thin films and the local electronic structure of metal supported graphene. After his PhD he joined the group of Prof. Harald Brune in the Federal Politechnical School of Lausanne (EPFL, Switzerland) until 2011, where he studied the influence of hydrogen in low energy inelastic tunnelling processes on STM experiments performed at cryogenic temperatures and the interpretation of atomic resolution STM images acquired on metal supported graphene systems. In 2011 he joined IMDEA Nanociencia.

Research lines

Current research lines aim to the magnetic functionalization of graphene for its potential use in the field of spintronics. Based on metal-supported graphene systems, they can be split into two main groups:

- Adsorption of organic molecules on metal-supported graphene, allowing a certain amount of charge transfer from the underlying metal to the preserved molecular orbitals.
- Intercalation of heavy metal atoms between graphene and the underlying metallic substrate, in order to enhance the weak Spin-Orbit coupling present in carbon atoms.
- The main experimental technique employed is the Spin-polarized Scanning Tunneling Microscopy (SP-STM) performed at low temperatures under ultra high vacuum conditions.

Relevant publications

- "Spatial Variation of a Giant Spin–Orbit Effect Induces Electron Confinement in Graphene On Pb Islands" F. Calleja, et col. *Nature Physics* **11**, 43-47 (2015).
- "Probing the Site-Dependent Kondo Response of Nanostructured Graphene With Organic Molecules" M. Garnica et col. *Nano Lett.,* 2014, **14**, 4560-4567
- "Long-range Magnetic Order in a Purely Organic 2D Layer Adsorbed on Epitaxial Graphene" M. Garnica et col. *Nature Physics* **9**, 368-374 (2013)

Juan José Navarro

Ph.D. Student

Carlos Guerrero

Máster student

Functional Molecular Nanoarchitectonics on Surfaces

Dr. David Écija

Researcher

Ph.D.: Universidad Autónoma de Madrid, Spain

Previous Position: Technical University of Munich, Germany

David Écija received a PhD degree in Physics from UAM, with a work on self-assembly of nanostructures on surfaces. He was awarded a Marie Curie Intra European Fellowship and moved to Prof. Barth´s group at the Technical University of Munich, where he carried out a four-year stay working on functional molecular nanoarchitectures on surfaces amenable to scanning probe microscopies. In January 2014 he joined IMDEA Nanoscience as Researcher and "Ramon y Cajal" fellow.

Research lines

- Functional molecular architectures on surfaces.
- Bidimensional materials (sp2-bonded supports: boron nitride, graphene, heterostructures).
- Lanthanides.
- Single molecule catalysts.
- Single molecule magnets.
- Organic solar cells.
- Organic light emitters.
- Molecular machinery.

Relevant publications

- "Controlled manipulation of gadolinium-coordinated supramolecules by low-temperature scanning tunneling microscopy" Urgel, J.I. et col. *Nano Lett.,* 2014, 14, 1369-1373
- "Surface-assisted dehydrogenative homocoupling of porphine molecules" Wiengarten, A. et col. *J. Am. Chem. Soc.,* 2014, **136**, 9346-9354
- "Control of molecular organization and energy level alignment by an electronically nanopatterned boron nitride template" Joshi, S. et col. *ACS Nano,* 2014, **8**, pp 430-442

Borja Cirera

Ph.D. student

Graphene Growth and Spectroscopy with Low-T STM

Prof. A. L. Vázquez de Parga
Associated Senior Scientist
Ph.D.: Universidad Autónoma de Madrid, Spain
Double Affiliation: Universidad Autónoma de Madrid, Spain

Amadeo L. Vázquez de Parga got his PhD in 1992 at the Universidad Autónoma de Madrid (UAM). Construction of a Scanning Tunneling Microscope (STM) working in ultra high vacuum, the first in Spain. He carried out a postdoc stay at IBM Research Laboratory in Rüschlikon (Switzerland) in photoluminescence excited by the STM. From 1999 Prof. Vázquez de Parga is Associate Professor in Condensed Matter Physics at the UAM and from 2008 Associated Senior Researcher at IMDEA-Nanoscience 2002-2003 visiting researcher at the Radboud University, Nijmegen (The Netherlands), working on spin polarized STM. Short research stays at Lawrence Berkeley Laboratory, California (1990), Max Planck Institute in Halle (Germany) (2000) and at University of Gakushuin, Tokio (Japan) (2004)

Research lines

- Currently we are working on graphene grown on different transition metals studying the crystallographic and electronic properties. Graphene is also used as substrate for molecular deposition. We are currently doing spin polarized STM measurements on molecules deposited on magnetic substrates. Another research line is the study of molecular self-assembly on metallic surfaces. The main techniques are scanning tunneling microscopy and spectroscopy, Low energy electron diffraction, Auger spectroscopy and X-ray photoelectron spectroscopy.

Relevant publications

- "Spatial Variation of a giant Spin-orbit Effect Induces Electron Confinement in Graphene on Pb Islands", F. Calleja eta col. *Nature Physics* **11**, 43-47 (2015)
- "Probing the Site-Dependent Kondo Response of Nanostructured Graphene with Organic Molecules", M. Garnica et col., *Nano Lett.*, 2014, **14**, 4660– 4567
- "Long-range Magnetic Order in a Purely Organic 2D Layer Adsorbed on Epitaxial Graphene", M. Garnica et col. *Nature Physics* **9**, 368–374 (2013)

Dr. Manuela Garnica
Postdoc
Universidad Autónoma de Madrid, Spain

Dr. Koen Lauwaet
Postdoc
K Leuven University, Belgium

Andrés Black
Ph.D. student

Bernardetta Karnasiewicz
Visiting Master student
(Wroclaw University, Poland) (October 2014 -December 2014)

Modelling Physical Properties of Nanostructures

Prof. Fernando Martín

Associated Senior Scientist
Ph.D.: Universidad Autónoma de Madrid, Spain
Double Affiliation: Universidad Autónoma de Madrid, Spain

Fernando Martín graduated in Quantum Chemistry in 1984 and in Theoretical Physics in 1986 at the Universidad Autónoma de Madrid (UAM). He received his PhD in 1986 at the same University and then moved to the University of Bordeaux, the University of Paris VI and the University of Chicago. He is currently Full Professor at UAM and Senior Research Associate at IMDEA. He is also the coordinator of the European COST Action "Chemistry with ultrashort pulses and free electron laser". In 2012 he received support from European (ERC Advanced Research Grant)

Research lines

- Attophysics: Control of electron dynamics with ultrashort pulses and free electron lasers.
- Surface science: Molecular self-assembly and reactivity on metal surfaces and graphene.
- Nanoscience: Structure and properties of fullerenes and nanoparticles.

Relevant Publications

- "Electron Localization Following Atto-Second Molecular Photoionization" G. Sansone et col. *Nature* **465**, 763-766 (2010)
- "Single Photon Induced Symmetry Breaking of H Dissociation" F. Martín et col. *Science* **315**, 629-630 (2007)
- "Complete Photo-Induced Breakup of the H Molecule as a Probe of Molecular Electron Correlation" W. Vanroose et col. *Science* **310**, 1787-1789 (2005)

Dr. Yang Wang

Postdoc
Universidad Autónoma de Madrid, Spain

Theoretical Study of Molecules on Surfaces

Prof. Manuel Alcamí

Associated Senior Scientist
PhD: Universidad Autónoma de Madrid, Spain
Double Affiliation: Universidad Autónoma de Madrid, Spain

Manuel Alcamí is full Professor of Chemical Physics at the Department of Chemistry at UAM and Associated Senior Scientist at IMDEA. He graduated in Chemistry at UAM in 1987 and received his PhD in Quantum Chemistry in 1990. He did a postdoctoral stage (1991-1993) at the University of Newcastle upon Tyne (UK). He is the national coordinator of the inter university master and doctorate programmes in Theoretical Chemistry and Computational Modelling (www.emtccm.og) and the chair of the COST Action CM1204 XLIC: XUV/X-ray light and fast ions for ultrafast chemistry (www.xlic.eu).

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:
- Theoretical study of self-assembly and charge transfer processes of molecules deposited on surfaces.
- Carbon nanostructures: fullerenes, fullerene metal derivatives and graphene.
- Fragmentation and stability of highly charged and highly excited molecules.

Relevant Publications

- "Probing the Site-Dependent Kondo Response of Nanostructured Graphene with Organic Molecules M. Garnica et col. *Nano Lett.,* 2014, **14**, 4560–4567
- "Elastic Response of Graphene Nanodomes" S. Koch et col. *ACS Nano,* 2013, **7**, pp 2927–2934
- "Long-range magnetic order in a purely organic 2D layer adsorbed on epitaxial graphene" M. Garnica et col. *Nature Physics* **9**, 368–374 (2013)

Atomic and Molecular Self-Assembly at Surfaces

Dr. Roberto Otero

Associated Scientist

Ph.D.: Universidad Autónoma de Madrid, Spain

Double Affiliation: Universidad Autónoma de Madrid, Spain

Dr. Roberto Otero received his Ph.D. degree from Universidad Autónoma de Madrid in 2002 under the supervision of Prof. Rodolfo Miranda, working on the relations between the electronic structure and the morphology of inorganic nanostructures. He then moved to the University of Aarhus, Denmark, where he joined the group of Prof. Flemming Besenbacher as a postdoctoral assistant. There, he got involved in the research about the self-assembly of organic molecules on solid surfaces by Variable-Temperature, Fast-Scanning Tunneling Microscopy. He is presently associated scientist at IMDEA Nanoscience.

Research lines

- The current scientific interest of Dr. Roberto Otero focus on the structural and chemical characterization of the interfaces between metals and organic materials, interfaces which are important for the performance of many organic electronic, optoelectronic and photovoltaic devices. For carrying out such studies, Dr. Roberto Otero uses an optimized experimental system that combines X-Ray Photoelectron Spectroscopy (XPS) and Variable-Temperature Scanning Tunneling Microscopy (VT-STM).

Relevant publications

- "Molecular Self-Assembly at Solid Surfaces" Roberto Otero et col. *Adv. Mat.* **23**, 5148 (2011)
- "Charge-transfer-induced structural rearrangements at both sides of organic/metal interfaces" Tzu-Chun Tseng et col. *Nature Chemistry* **2**, 374 (2010)
- *"Elementary Structural Motifs in a Random Network of Cytosine Adsorbed on a Gold(111) Surface"* Roberto Otero et col. *Science* **319**, 312-315 (2008)

Alberto Martín

Ph.D. student

Arancha Iglesias

Master student

Physics of Surfaces and Thin Films

Dr. José María Gallego

Associated Scientist

Ph.D.: Universidad Autónoma de Madrid, Spain

Double Affiliation: Instituto de Ciencia de Materiales de Madrid-CSIC

José Maria Gallego received his B.S. degree in physics from the Universidad Autónoma de Madrid in 1986 and completed his Ph.D. in 1991 with Prof. Rodolfo Miranda. He continued his postdoctoral studies with Prof. Ivan K. Schuller at the University of California in San Diego, before joining the Spanish Consejo Superior de Investigaciones Científicas (CSIC) in 1996 as a tenured scientist. In December 2010 he joined IMDEA-Nanociencia as an Associated Researcher.

Research lines

- His research interest is centered on the physics of surfaces and thin films, in particular in scanning tunneling microscopy and electron spectroscopy studies of epitaxial growth, in ultrahigh vacuum conditions, of both organic and inorganic materials on solid surfaces.

Relevant Publications:

- "An Organic Donor/Acceptor Lateral Superlattice at the Nanoscale" Otero, Roberto et col. *Nano Lett.*, 2007, **7**, pp 2602-2607
- "Atomistic Mechanism of Surfactant-Assisted Epitaxial Growth"G. Rosenfeld et col. *Phys. Rev. Lett.* **81**, 850 (4pp) (1998)
- "Influence of the Growth Conditions on the Magnetic Properties of fcc Cobalt Films:from Monolayers to Superlattices" J.J. de Miguel et col. *Journal of Magnetism and Magnetic Materials* **93**, (1991)1-9

Jesús Matarrubia

Master student

Structure and Reactivity of Mineral Surfaces

Dr. Carlos M. Pina

Associated Scientist

Ph.D.: Universidad Complutense de Madrid, Spain

Double Affiliation: Universidad Complutense de Madrid, Spain

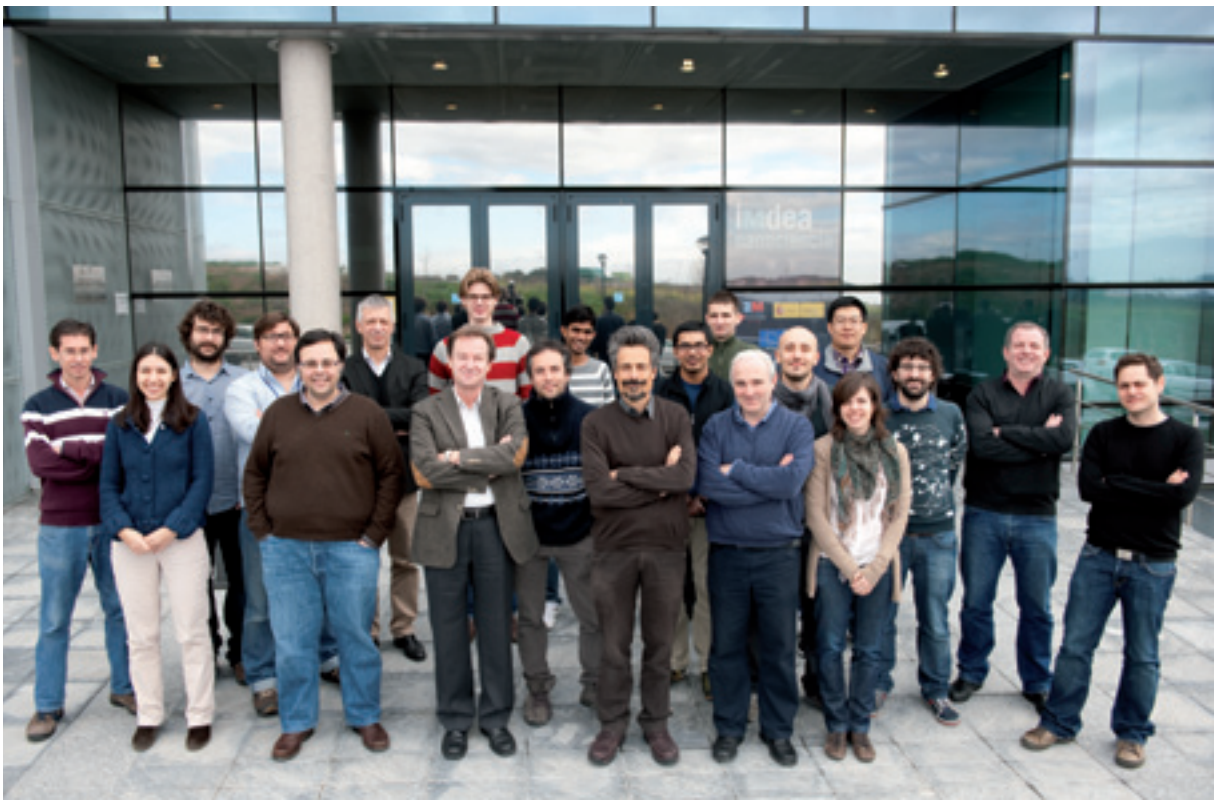
Carlos M. Pina got his Ph.D. in Geology from the Universidad Complutense de Madrid (UCM) in 1996. From 1997 to 2001, he was member of the research group directed by Professor Andrew Putnis at the Institute for Mineralogy at the University of Münster (Germany). In 2001, Dr. Pina joined the Department of Crystallography and Mineralogy at the UCM as a "Ramón y Cajal" researcher and became lecturer in Crystallography and Mineralogy in 2005. Through his research, Dr. Pina has contributed to the study of the nanoscale processes occurring at the mineral-fluid interfaces. He has investigated the effect of the symmetry and the anisotropy on the nanoscale crystal growth mechanisms, the formation of solid solutions and epitaxial monolayers on mineral surfaces, and the effect of inorganic and organic impurities on the growth kinetics of minerals from aqueous solutions. At IMDEA, Dr. Pina is member of the Nanotribology group.

Research lines

- Crystal growth mechanisms operating on mineral surfaces.
- Formation and nanomanipulation of overgrowths on mineral surfaces.
- Structure of crystal surfaces in liquid environments.
- Interaction between multicomponent aqueous solutions and minerals.
- Relationships between crystallization kinetics and composition in solid solution-aqueous solution systems.

Relevant publications

- "Epitaxial Growth of Calcite Crystals on Dolomite And Kutnahorite (104) Surfaces" C. Pimentel, C.M. Pina and E. Gnecco *Cryst. Growth Des.* 2013, **13**, pp 2557–2563
- "The Composition of Solid Solutions Crystallising from Aqueous Solutions: The Influence of Supersaturation And Growth Mechanisms" C.M. Pina, M. Enders and A. Putnis. *Chemical Geology* **168**, 195-210 (2000)
- "Molecular-Scale Mechanisms of Crystal Growth in Barite" C.M. Pina et col. *Nature* **395**, 483- 486 (1998)



programme 3
nanomagnetism

This Programme deals with the preparation and characterization of Advanced Magnetic Nanomaterials and explores some of their biomedical applications. The materials, both inorganic and organic, are grown by Molecular Beam Epitaxy (MBE) in ultra-high vacuum environment, by sputtering or by chemical synthesis. They are ultrathin films, superlattices, or nanoparticles and their magnetic properties are characterized by morphological, structural, electronic, and (mostly optical) Magnetometry techniques. Additionally, large scale experimental facilities (i.e., synchrotron, neutron, or ion-accelerator sources) are often used to elucidate some fundamental aspects. Particular emphasis is placed on magnetization reversal processes of low-dimensional artificial magnetic structures. The preparation and characterization of magnetic nanoparticles for use in Nanobiomedicine has recently emerged as an important research line in this Programme with the aim to develop ultrasensitive NMR molecular imaging agents, magnetic carriers for in vivo targeting of therapeutic compounds or hyperthermia treatment of cancer. Appropriate theoretical modelling also plays a role in the Programme.

Growth and Characterization of Magnetic Nanomaterials

Dr. Julio Camarero

Associated Senior Scientist
Ph.D.: Universidad Autónoma de Madrid, Spain
Double Affiliation: Universidad Autónoma de Madrid, Spain

Julio Camarero received his PhD in physics from the Universidad Autónoma de Madrid in 1999. He then worked at Institut Néel-CNRS France (Marie-Curie Fellow and scientific contracts) before returning to UAM in 2003 as Ramón y Cajal research fellow. JC is currently Associate Professor of the Condensed Matter Physics Department. In 2008 he joined IMDEA Nanoscience as Associated Senior Scientist, leading the Nanomagnetism Program. JC has coordinated National Regional and European projects and has published more than 70 peer-reviewed papers (> 1600 cites, h-index: 22), 11 book chapters, 4 invited papers, and 1 EU patent. 25 invited talks at international conferences (150 other conference presentations). JC is a frequently invited scientist in different Synchrotron Radiation Facilities.

Research lines

- The current scientific interest of Dr. Julio Camarero includes the preparation and characterization of artificial magnetic (inorganic and organic) nanostructures, as well as the development of novel experimental techniques. Particular attention is devoted to studies on quasi-static and dynamic magnetization reversal processes and magnetoresitive responses. His goal is to acquire a better understanding of the fundamental physics of new functional properties of magnetic nanostructures that are important, or may become important, for applications in information-storage, spintronics, and biomedicine areas.

Relevant Publications

- "Direct Experimental Determination of the Anisotropic Magnetoresistive Effects" P. Perna et col. *Appl. Phys. Lett.* **104**, 202407 (4pp) (2014)
- "Accurate Determination o the Specific Absorption Rate In Superparamagnetic Nanoparticles Under Non-Adiabatic Conditions" F.J. Terán et col. *Appl. Phys. Lett.* **101**, 062413 (4 pp) (2012)
- "Molecular *vs.* Inorganic Spintronics: The Role of Molecular Materials and Single-Molecules". J. Camarero et col. *J. Mater. Chem.* **19**, 1678-1684 (2009). Highlight
- "Self-Organized Hexagonal Patterns of Independent Magnetic Nanodots" T. Bobek et col. *Adv. Mat.* **19**, 4375-4380 (2007)
- "Origin of the Asymmetric Magnetization Reversal Behavior in Exchange-Biased Systems: Competing Anisotropies" J. Camarero et col., *Phys. Rev. Lett.* **95**, 057204 (xpp) (2005)

Permanent Magnets and Applications. Spintronics

Dr. Alberto Bollero

Senior Researcher & Head of Division of Permanent Magnets and Applications

Ph.D.: Technical University of Dresden, Germany

Previous Position: SPINTEC-CEA, Grenoble (France)

Alberto Bollero got his B.Sc degree in Physics from Universidad Complutense de Madrid. He was a PhD student at IFW-Dresden, working on nanocrystalline permanent magnets and got his PhD degree at Technical University of Dresden in 2003. He was Postdoc at University of Leipzig, studying magnetic and magnetotransport properties of thin films, and Marie Curie Fellow at SPINTEC (CEA-Grenoble) on exchange-bias systems for spintronics and sensing applications.Dr.Bollero was researcher at CIEMAT-Madrid working on flexible photovoltaic films and solar control coatings for architectural applications. He began his research activity at IMDEA Nanociencia in 2010 as Ramón y Cajal fellow and got the I3 Certification of scientific and technological excellence by MINECO in 2012.

In 2012 Dr. A. Bollero settled at IMDEA the laboratory of Permanent Magnets and since then he is Head of the Division of Permanent Magnets and Applications.

[http://www.nanoscience.imdea.org/division-permanent-magnets-applications]

Research lines

- Bollero is Coordinator of the EU Project NANOPYME [www.nanopyme-project.eu], dealing with the search of new permanent magnets based on hybrid ferrites.
- He is PI in a Bilateral (Germany-Spain) Project [Ref. 57050243] focused in the development of functional exchange-coupled permanent magnets bilayers with sensing applications.
- He is PI in a National Project SIESPER [MAT2011-25598] dealing with the exchange-bias phenomenon in nanostructured films.
- These projects position A. Bollero as P.I. on research projects that total over 4.5 M€.

Relevant Publications

- "Effective high-energy ball milling in air of Fe65Co35 alloys" P. Sirvent et col. *J. Appl. Phys.* **115**, 17B505 (3pp) (2014)
- "Origin and control of exchange bias-like phenomenon in coupled ferromagnetic [Pt/Co]/NiFe bilayers", A. Bollero et col., *Phys. Review B 84*, 094423 (8pp) (2011)
- "Enhanced exchange bias effects in a nano-patterned system consisting of two perpendicularly-coupled ferromagnets", A. Bollero et col., *Appl. Phys. Lett.* **92**, 022508 (3pp) (2008)

Dr. Gabriel Rodríguez

Postdoc

Universidad de Oviedo, Spain

Dr. Eva Céspedes

Postdoc

Institute for Science and Technology in Medicine-Keele University UK

Francisco Javier Pedrosa

Ph. D. student

Karol Golasisnski

Ph. D. student

(Warsaw University of Technology, Poland)

Javier Rial

Internship

Almudena Quiñones

Internship

Growth & Nanostructuring. Magneto-electric Thin Films

Dr. Feng Luo

Senior Researcher

Ph.D.: Peking University, China

Previous Position: Peking University, China

Feng Luo got his PhD in Materials Chemistry at the College of Chemistry and Molecular Engineering, Peking University in 2004. Then he worked as a postdoc in the Max-Planck-Institute for Microstructure Physics (Germany) and in the Laboratory for Micro- and Nanotechnology from the Paul Scherrer Institut (Switzerland) until Oct. 2009. From 11/2009-11/2010, he was appointed as a principal investigator in the College of Engineering at Peking University. Since 12/2010 he works at IMDEA-Nanoscience (Madrid) studying inorganic/organic hybrid magnetic nanostructures and magnetioelectric thin film devices with applications in spintronics.

Research lines

- Tuning magnetic and electric properties of multifunctional materials by designing and controlling interfaces at atomic scale, including interfaces of magnetic nanostructures, magneto- elasticelectric multifunctional thin film composites and hybrid ferromagnetic/organic interface of Molecular spintronics. Investigation of multi- functional magnetoelectric devices by micro and nanofabrication techniques

Relevant Publications

- "Strongly Enhanced Orbital Moment by Reduced Lattice Symmetry and Varying Composition Of $Fe_{1-x}Co_x$ Alloy Films" Fikret Yildiz et col. *Phys. Rev. Lett.* **100**, 037205 (4pp) (2008)
- "Tuning the Perpendicular Magnetic Anisotropy in Tetragonally Distorte $Fe_{1-x}co_x$ Alloy Films On Rh (001) by Varying the Alloy Composition" Feng Luo et Col. *Appl. Phys. Lett.* **91**, 262512 (3pp) (2007)
- "Tuning Negative and Positive Magnetoresistances by Variation of Spin-Polarized Electron Transfer into p-Conjugated Polymers" Feng Luo et col. *Appl. Phys. Lett.* **84**, 1719 (4pp) (2004)

Dr. Rubén Guerrero

Postdoc

Institut d'Electronique Fondamentale (IEF) Université Paris-Sud, France

Hauyu Feng

Ph. D. student

(Beijing Normal University, China)

MBE Growth of Magnetic and Organic Thin Films and Nanostructures. Photoelectron Microscopy

Dr. Miguel Ángel Niño

Researcher

Ph.D.: Universidad Autónoma de Madrid, Spain

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

Miguel Angel Niño received his PhD at Universidad Autónoma de Madrid working on magnetic self organized nanostructures and metastable alloys. Then he joined the X-ray Microscopy group of A. Locatelli and M. Kiskinova at Elettra Synchrotron (Italy) as postdoctoral fellow, and after as beamline scientist, performing Photoemission Electron Microscopy and Low Energy Electron Microscopy applied to growth and characterization of magnetic thin films and nanostructures. With more than 45 publications in international journals and more than 70 communications at international congresses, he joined IMDEA Nanoscience in 2011.

Research lines

- Characterization of nanostructures and nanoparticles on surfaces with X ray techniques and photoelectron microscopy.
- MBE growth of thin films with applications in magnetic systems: control of magnetoresistance and magnetic anisotropy through atomic interface design and electric fields.
- Hybrid molecular-magnetic structures: organic spin valves, molecular magnets, chiral molecules on surfaces.
- MBE growth of organic solar cells.

Relevant publications

- "Enantiospecific Spin Polarization of Electrons Photoemitted through Layers of Homochiral Organic Molecules" M.A. Niño et col. *Adv. Matter.* 2014, **26**, 7474–7479
- "Spatially Resolved, Site-Dependent Charge Transfer and Induced Magnetic Moment In TCNQ Adsorbed on Graphene" D. Maccariello et col. *Chem. Mater.*, 2014, **26**, pp 2883–2890
- "Desorption Kinetics from a Surface Derived from Direct Imaging of the Adsorbate Layer" S. Gunther et col. *Nature Commun.* **5**, 1709-1714 (2013)

Dr. Cristina Navío

Postdoc

Mons University, Belgium

Fernando Ajejas

Ph.D. student

Functional interfaces for Spintronics

Dr. Paolo Perna

Researcher

Ph.D.: University of Caen Basse-Normandie, France & University of Cassino, Italy

Previous Position: CNR-SPIN, Italy

Paolo Perna obtained the theoretical MD in Physics on 2003 at the University Federico II in Naples (Italy) and then moved to the experimental research physics. On 2008, he obtained **two PhD titles** in *Physics: Condensed Matter and Devices* from the University of Caen Basse-Normandie (France) and in *Mechanical Engineering (Material Science)* from the University of Cassino (Italy). He has been an individual exchange fellowship from the ESF on 2006. After a postdoctoral research contract at the CNR-SPIN in Naples (Italy), on 2009 he joined the Nanomagnetism's group at IMDEA Nanoscience within the Marie Curie AMAROUT fellowship program and, on 2011 he obtained a *Juan de la Cierva* fellowship.

Actually, he is researcher at IMDEA Nanociencia in which he is Responsible of the Advanced Magneto Optics Lab and of the Sputtering facility of the Multi-purpose UHV growth/spectroscopy Lab.

Research lines

- His research activities cover both fabrication and characterization of magnetic and non-magnetic systems focusing on their fundamental properties and potential technological applications. In particular, he is interested in the realization of *spintronics* devices by employing *innovative materials*, *with tailored functionalities*. His research mainly regards *a)* **Transition Metal Oxides (TMO) for a *beyond silicon microelectronics***, and *b)* **From conventional to molecular spintronics**.

Relevant Publications

- "Direct experimental determination of the anisotropic magnetoresistive effects" P. Perna et col. *Appl. Phys. Lett.* **104**, 2012407 (4pp) (2014)
- "Conducting interfaces between band insulating oxides: The LaGaO3/SrTiO3 heterostructure" P. Perna et col. *Appl. Phys. Lett.* **97**, 152111 (4pp) (2010)
- "High Curie temperature for $La_{0.7}Sr_{0.3}MnO_3$ thin films deposited on CeO_2/YSZ-based buffered silicon substrates" P. Perna et col. *J. Phys.: Condens. Matter* **21**, 306005 (2009)

Davide Maccariello

Ph. D. student

José Luis Fdez. Cuñado

Ph. D. student

programme 4
nanobiosystems: biomachines and manipulation of macromolecules

This programme deals with the study of biological macromolecules and their interactions to build biological nanomachines,. Different groups study macromolecular assembly, structure and functional properties of complexes, 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. We are also interested in the study of nanomechanical properties of biological complexes (from enzymes up to viruses), and optical trapping-based approaches to study the behavior 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.

Prof. José L. Carrascosa
Programme Manager
Ph.D.: Universidad Autónoma de Madrid, Spain
Double Affiliation: Centro Nacional de Biotecnología CNB-CSIC, Spain

Prof. Carrascosa is Research Professor of the CSIC and head of a research line in the Department of Structure of Macromolecules at the Centro Nacional de Biotecnología. He has been involved in the development of advanced microscopy methods for the structural analysis of biological material, with special emphasis in the study of different viral model systems. His activity has produced more than 220 publications with an H index of 46. Prof. Carrascosa has carried out an extended international activity: President of the European Microscopy Society (2000-2004), member of the Executive Committee of the International Federation of Microscopy Societies (2010-2014), member of the Scientific Advisory Board of the European Synchrotron Radiation Facility (1995-1996; 2003-2005; 2006-2008), and Chairman of the Scientific Advisory Committee of ERA-Instruments (2008-2011), among others. He is President of the Spanish Microscopy Society (2012-2016), and he has been President of the Spanish Biophysical Society (2003-2007) and President of the Spanish Society of Cell Biology (1993-1996). Prof. Carrascosa is member of the editorial boards of the Journal of Structural Biology and Micron.

Relevant publications

- "Direct measurement of the dielectric polarization properties or DNA". A. Cuervo et col. *Proc. Natl. Acad. Sci. USA* **111** E3624-E3630 (2014)
- "The interplay between mechanics and stability of viral cages". M Hernando-Pérez et col. *Nanoscale,* **6**, 2702-2709 (2014).
- "Structural Characterización of the Bacteriophage T7 Tail Machinery". A. Cuervo et col. *J. Biol. Chem.* **288**, 26290-26299 (2013)

Optical Nanomanipulation in Molecular and Cell Biophysics

Dr. Ricardo Arias-González

Researcher

Ph.D.: Universidad Complutense de Madrid, Spain

Previous Position: Centro Nacional Biotecnología (CNB- CSIC), Madrid, Spain

Dr. Arias-González received both his Master Degree in Theoretical Physics in 1997 and his Ph.D. in 2002 from Complutense University in Madrid. During his Ph.D. research in the Materials Science Institute, Madrid, and short stays in École Centrale Paris and EMBL-Heidelberg, he developed theory and simulations to understand the electromagnetic field in nanoparticles. Then, he moved to U.C. Berkeley for his postdoctoral training, where he studied DNA with single molecule approaches. In 2006, he worked at the National Centre of Biotechnology, Madrid, where he developed a state-of-the-art optical tweezers. Since 2008, he has joined IMDEA Nanoscience, leading of the Optical Nanomanipulation Lab.

Research lines

- Dr. Arias-González is working in the field of Molecular and Cell Biophysics, furthering the study of the macromolecules that make up the machinery of cells. His research lines cover three fundamental scale levels in Biology, namely, the molecule, the organelle and the cell. Specifically, his team investigates structural transitions of nucleic acids, molecular motors and electrophysiology of organelles from the single-molecule point of view. He is also interested in the development of biophysical techniques for these re- search purposes.

Relevant publications

- "Single-molecule portrait of DNA and RNA double helices" J.R. Arias-Gonzalez *Integr. Biol.,* 2014, **6**, 904-925
- "Laser Heating Tunability by Off-Resonant Irradiation of Gold Nanoparticles" S. Hormeño et col. *Small 2014,* **10**, 376–384
- "Mechanical Identities of RNA and DNA Double Helices Unveiled at the Single-Molecule Level" E. Herrero-Galán et col. *J. Am. Chem. Soc.,* 2013, **135**, 122-131
- "Optical Tweezers Applied to Viruses", J.R. Arias-Gonzalez, *Springer (book chapter) (2013).*

Irene Gutiérrez

Ph.D. student

Elisa Poyatos

Master student

Optical and Magnetic Tweezers

Dr. Borja Ibarra

Researcher

Ph.D.: Universidad Autónoma Madrid, Spain / CNB-CSIC Madrid, Spain

Previous Position: Centro Nacional Biotecnología (CNB- CSIC), Madrid, Spain

Borja Ibarra received his PhD. in Molecular Biology from the Universidad Autónoma de Madrid in 2001. He made the 'leap' to molecular biophysics as a postdoctoral fellow at University of California, Berkeley. There, he learned the techniques of single-molecule force spectroscopy and us ing optical tweezers he developed a single-molecule mechanical assay to study the dynamics of molecular motors involved in DNA replication. Back in Spain in 2007, he applied this technology at the CNB-CSIC to study biological molecular motors at single molecule level. He joined the Nanobiosystems research line at IMDEA Nanoscience in 2010.

Research lines

- Many essential processes inside the cell involve mechanical tasks, which are carried out by specialized proteins called molecular motors. They are able to convert chemical energy into mechanical work at the molecular scale and therefore, present interesting biomedical and nanotechnological applications. In our laboratory we use single molecule manipulation techniques to understand the physical mechanism by which these molecular machines operate.

Relevant publications

- "Manipulation of Single Polymerase-DNA Complexes: A Mechanical View of DNA Unwinding During Replication." Morin J. A. et col. *Cell Cycle* **11** 2967-2968 (2012)
- "Active DNA Unwinding Dynamics during Processive DNA Replication" Morin J.A. et col. *Proc. Nat. Acad. Soc. USA* 2012 **109** 8115-8120
- "Proofreading Dynamics of a Processive DNA Polymerase" Ibarra, B. et al. *EMBO Journal* **28**, 2794-2802 (2009)

José Alberto Morín

Ph.D. student

La Havana University, Cuba

Fernando Cerrón

Ph.D. student

Super Resolution Fluoresce Microscopy

Dr. Cristina Flors

Researcher

PhD: Institut Quimic de Sarria, Spain

Previous Position: University of Edinburgh, Edinburgh, UK

Cristina Flors completed a PhD in Chemistry at the Institut Químic de Sarrià (Barcelona) in 2004 under the supervision of Prof. S. Nonell. In 2005 she moved to the laboratory of Prof. J. Hofkens at the Katholieke Universiteit Leuven (Belgium) to learn single-molecule and super-resolution fluorescence microscopy. In 2008 she began her independent research career at the University of Edinburgh, where she started a new research program to develop methodology for super-resolution imaging of DNA. In February 2012 she moved to IMDEA Nanoscience as a Researcher and Ramón y Cajal fellow.

Research lines

- Super-resolution fluorescence microscopy of DNA: We develop new imaging methods specifically tailored to DNA, which allow a spatial resolution of tens of nanometers.
- Genetically-encoded singlet oxygen photosensitizers: The objectives of this research line are to understand singlet oxygen photosensitization by proteins, engineer new and better mutants, and use them in applications such as photodynamic.

Relevant publications

- "Correlative Atomic Force Microscopy and Localization-Based Super-Resolution Microscopy: Revealing Labelling and Image Reconstruction Artefacts" A. Monserrate et col. *ChemPhysChem* 2014 **15** , 64-65
- "Super-resolution Fluorescence Imaging of Directly Labelled. DNA: from Microscopy Standards to Living Cells" C. Flors *J. Microsc.* **251**, 2013, pp. 1-4
- "Singlet Oxygen Generation by the Genetically Encoded Tag miniSOG" R. Ruiz-González A. Monserrate et col. *J. Am. Chem. Soc.*, 2013, **135**, 9564-9567

Dr. Alberto R. Pulido

Postdoc

Groningen University, The Netherlands

Aitor Monserrate

PhD student

Patricia Bondía

PhD student

Dominica Zurek-Biesiada

PhD student

(Jagellonian University, Krakow, Poland) (October 2014)

Proteins as Tools In Nanotechnology

Dr. Begoña Sot

Researcher

PhD.: Universidad del Pais Vasco, Spain

Previous Position: Centro Nacional Biotecnología (CNBCSIC), Madrid, Spain

Dr. Sot did her PhD in Universidad del Pais Vasco, under the supervision of Prof. Arturo Muga, focused on the allosterism of chaperons. Then she worked with Prof. Alan Fersht (Centre for Protein Engineering, Cambridge) gaining knowledge in biophysical characterization of protein-protein interactions. Later she worked with Prof. Alfred Wittinghofer (MPI, Dortmund) studying the activation of G-proteins activity by protein- protein interactions and its regulation by co-localization. In 2011 he joined Prof. Jose Maria Valpuesta`s group (CNB-CSIC), where she learned Electron Microscopy techniques. Finally, she joined IMDEA in December 2012 as Ramón y Cajal fellow.

Research lines

- Use of proteins as tools in nanotechnology and nanomedicine, specifically, the design of bio-nanotechnology tools of engineered proteins and gold nanoparticles able to load Antigen Presenting Cells with antigens and siRNAs for their use in immunotherapy.

Relevant publications

- "Ras GTPase Activating (Rasgap) Activity of the Dual Specificity GAP Protein Rasal Requires Colocalization and C2 Domain Binding to Lipid Membranes" Sot B et col. *Proc. Natl. Acad. Sci. USA* **110** 111–116 (2013)
- "Unravelling the Mechanism of Dual-Specificity GAPs" Sot B et col. *EMBO Journal* **29**, 1205-1214 (2010)
- "Comparative Biophysical Characterization of the Interaction of P53 with the Pro-Apoptotic BAK and the Anti-Apoptotic BCL-Xl" Sot B et col., *J. Biol. Chem.* **282**, 29193-200 (2007)

Nuclear Magnetic Resonance for Biological Systems

Dr. Nicola d´Amelio

Researcher
Ph.D.: Universities of Perugia, Italy
Previous Position: University College London, UK

My research has been directed towards the study of biological systems mainly using Nuclear Magnetic Resonance. During my PhD research (Universities of Perugia and Utrecht), I worked on the structure and the dynamics of biomolecules with a particular focus on bio-inorganic chemistry. During my post-doc (CERM of Florence) I used paramagnetic relaxation as a tool for structural constraints. This knowledge was transferred to medical applications during my stay industry (Bracco imaging), National Oncological Spanish Center for Cancer Research (CNIO, Centro Nacional Investigaciones Oncologicas), and UCL, where I focused my research on the dynamics of oncoproteins. At present, I am researcher in the group of Prof. Muñoz (National Center of Biotchnology (CNB) and Instituto Madrileño de Estudios Avanzados en Nanociencia (IMDEA-Nanociencia).

Relevant Publications

- "Understanding the structural specificity of Tn antigen for its receptor: an NMR solution study" D'Amelio N. et col. *Carbohydrate Research,* **351** (2012), 114-120.
- "NMR structural model of the interaction of herbicides with the photosynthetic reaction center from *Rhodobacter sphaeroides*" D'Amelio N. et col. *Chem biochem,* **5** (2004), 1237-1244
- "The C terminus of apocytocrome b562 undergoes fast and slow conformational exchange among ordered conformations resembling the folded state" D'Amelio N. et col. *Biochemistry,* **41** (2002), 5505-5514

Conformational-Functional Behavior of Proteins

Prof. Víctor Muñoz

Associated Senior Scientist (Unidad de Nanobiotecnologa Joint Unit IMDEA Nancieincia-CNBCSIC)
Ph.D.: Universidad Autónoma de Madrid, Spain / EMBL-Heidelberg, Germany
Previous Position: Centro Nacional Biotecnología (CNB-CSIC), Madrid, Spain

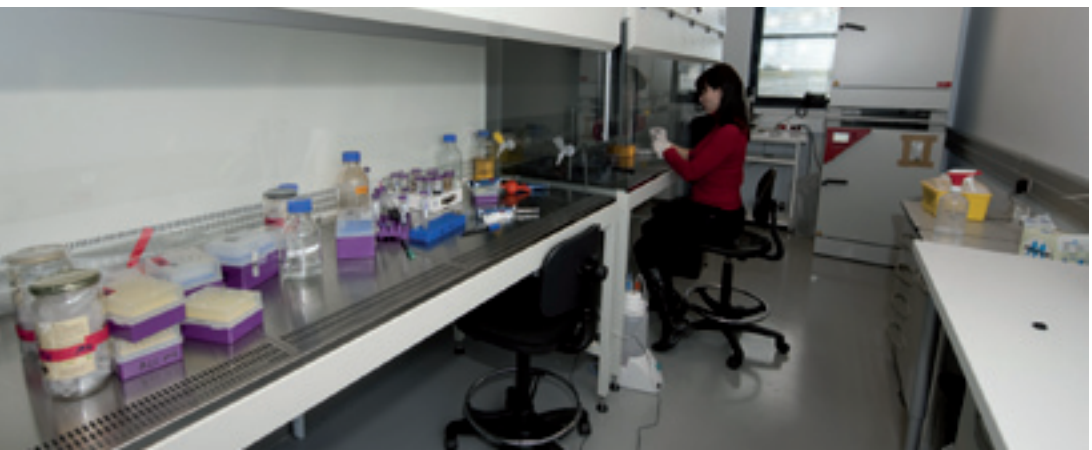
Prof. Víctor Muñoz´s research efforts have centered about the development of multidisciplinary approaches to study protein folding and function. Since his return to Spain in 2007 he has designed and implemented a novel method to resolve equilibrium protein unfolding at atomic resolution using NMR and determine the interaction in protein folding, he also designed an experimental analysis (thermodynamics, structural and ultrafast kinetics) of a synthetic model protein that folds into a defined 3D structure in order to investigate the primordial folding, developed innovative photoprotection methods that extend the resolution of single-molecule fluorescence experiments down to the microsecond timescales.

Research lines

- Victor Muñoz´s group is currently investigating the conformational—functional behavior of proteins. They employ kinetic techniques (stopped-flow, continuous flow, T-jump), steady state spectroscopy (fluorescence, absorption, circular dichroism), nuclear magnetic resonance, single molecule studies and high performance computing to answer questions concerning the intimate behavior of proteins. Main research avenues of the group could be divided into: (i) exploration of protein folding ensembles, (ii) structure prediction and design through calculation of folding free energy surfaces, (iii) understanding downhill folding and testing the molecular rheostat hypothesis, and (iv) new concepts and approaches in protein aggregation.

Relevant Publications

- "Experimental identification of downhill protein folding" García-Mirá MM et col. *Science* **298**, 2191-2195 (2002).
- "Atom-by-atom analysis of global downhill protein folding" Sadqi M. et col. *Nature* **442**, 317-321 (2006)
- " A photoprotection strategy for microsecond-resolution single-molecule fluorescence spectroscopy" Campos LA et col. *Nature Meth.* **8** 143-146. News and Views (M. Gruebele, *Nature Meth.* **8**, 213-215) (2011); Highlighted in *Nature Struct. Mol. Biol.*



programme 5
nanoelectronics and superconductivity

This program mainly deals with Electric Transport in Nanosystems. Alternative approaches to the silicon-based semiconductor industry may involve devices based on graphene nanostructures or transport through single molecules. Chemical synthesis to tailor molecular structure and functionality (in connection with Program 1), systematic variation of temperature and/ or vacuum conditions and theoretical computations are necessary complements to gain a wider perspective in molecular electronics. A second area of interest is Superconducting Nanostructures, i.e. mesoscopic superconductors fabricated as superlattices, nanowires or nanodots, where the way in which confinement and proximity phenomena between superconductors and materials with other properties (e.g. magnetic) is explored.

Prof. José Luis Vicent
Programme Manager
Double Affiliation: Universidad-Complutense de Madrid, Spain

Jose Luis Vicent is professor of Physics in the Departamento de Física de Materiales (Universidad Complutense, Madrid) and Director of the Center for Physical Techniques (CAI Técnicas Físicas) of Universidad Complutense. Prof. Vicent has worked in the Physics Department at University of Virginia, F. Bitter National Magnet Lab. at MIT, Solid State and Materials Science Divisions at Argonne National Lab., Department of Physics at University California-San Diego, Centro Atómico Bariloche (Argentina), and Universidad del Valle (Colombia). He is Fellow of the American Physical Society, and member of the Royal Spanish Physical Society (RSEF), he has been secretary of its Publication committee, and Chairman of the Spanish Condensed Matter Division (RSEF, Real Sociedad Española de Fisica). Professor Vicent has been the Chairman of the Materials Science Commission (Spanish National Science Foundation) and National Coordinator of the Materials Science Program (Spanish CICYT, Science & Technology Commission) 1993 –1995.

Prof. Vicent has been the advisor of more than 20 master and Ph. D. graduate students. Prof. Vicent publications cover a diversity of materials from single crystals to metallic glasses, and many different effects mostly related to magnetism and superconductivity at the nanoscale.

Research lines

- The Prof. Vicent research is focused on low dimensional superconductivity and magnetism, covering superlattices, magnetic metallic glasses, fabrication of magnetic and superconducting nanostructures, high temperature superconductivity, nanomagnetism, superconducting vortex physics, and hybrid magnetic/ superconducting nanostructures.

Relevant publications

- "Artificially Induced Reconfiguration of the Vortex Lattice by Arrays of Magnetic Dots" José I. Martín, et col. *Phys. Rev. Lett.* **83**, 1022 (4pp) (1999)
- "A Superconducting Reversible Rectifier that Controls the Motion of Magnetic Flux Quanta" J. E. Villegas et col. *Science* **302**, 1188-1191 (2003)
- "Quantitative Decoding of Interactions in Tunable Nanomagnet Arrays Using First Order Reversal Curves", D. A. Gilbert et col. *Scientific Reports* **4**, 4204 (5pp) (2014)

Electrical Conductivity of Single Molecules

Dr. Teresa González

Researcher

Ph.D. Universidad de Santiago de Compostela, Spain

Previous Position: University of Basel. Switzerland

Teresa González graduated in Physics in 1996 at the University of Santiago de Compostela (Spain). She got her Ph. D. in 2003 at the same university, with a study on melt-textured high-Tc superconductors, which was awarded with the Premio Extraordinario de Doctorado. From 2004 to 2008 Dr. González was Research Assistant at Basel University (Switzerland) with Professor Christian Schönenberger. There, she worked on the electrical properties of single molecules in a MCBJ setup. She joined IMDEA-Nanociencia as a Ramón y Cajal research fellow in 2008.

Research lines

- Molecular electronics: study of the electrical properties of single molecules using a scanning tunnelling microscope. She investigates different techniques to contact an individual molecule, and studies its properties under different conditions, at low and room temperatures. Currently her research is focused on different studies about compounds such as alkanes, oligo(phenyleneethynylenes), fluorenes, porphyrines and phthalocyanines; and different chemical binding.

Relevant publications

- "Molecular Junctions Based on Aromatic Coupling" Songmei Wu et col. *Nature Nanotechnology* **3**, 569-574 (2008)
- "Electrical Conductance of Molecular Junctions by a Robust Statistical Analysis" M. T. González, et col. *Nano Lett.*, 2006, **6**, 2238-2242
- "Enhancement of Jc under Magnetic Field by Zn Doping in Melt-Textured Y-Ba-Cu-O Superconductors" M. T. González et col. *Supercond. Sci. Technol.* **15** 1372 1376 (2002)

Dr. Edmund Leary

Postdoc

University of Liverpool, UK

Siya Sherif

Ph.D. student

(Mysore University, India)

Fabrication and Properties of Nanostructured Superconductors

Dr. David Pérez de Lara

Researcher

Ph.D.: Istituto di Cibernetica del CNR, Italy / Instituto Nacional de Física Nuclear (INFN), Italy

Previous Position: Universidad Complutense de Madrid, Spain

Graduated in Theoretical Physics at UAM (1994), David Pérez de Lara got a PhD from UAM-IC-CNR in 2003. he has had positions at ESA/ESTEC (The Netherlands 2 years), Istituto di Cibernetica of the National Italian Research Council (IC-CNR), Italian Istituto Nazionale di Fisica Nucleare (INFN) (3 years), 'Decoherence and Entanglement in Quantum Complex Systems (DEQUACS-INFM 1 year), Fondo per gli Investimenti della Ricerca di Base (FIRB) of the Italian Ministry (MUR 3 years) and Universidad Complutense de Madrid (3 years). He had joined IMDEA Nanociencia in 2010.

Research lines

- The main research activity is focused on the nanofabrication, experiments at low temperatures and modelization of superconducting devices with magneticnanoarrays. Vortex dynamics and ratchet effects in superconductors are some relevant topics under investigation. This investigation is related to the development of superconducting- magnetic hybrid electronic devices based on a controlled and directional vortex motion.

Relevant publications

- "Rocking Ratchet Induced by Pure Magnetic Potentials with Broken Reflection Symmetry" D. Perez de Lara, et col. *Phys. Rev. B* **80**, 224510 (8pp) (2009)
- "Static and Dynamic Properties of Annular Josephson Junctions with Injected Current" D. Perez de Lara, et col. *Phys. Rev. B* **73**, 214530 (6 pp) (2006)
- "Recent Developments in Superconducting Tunnel Junctions for Ultraviolet, Optical & Near Infrared" A. Peacock et col. *Astronomy. Astrophys. Suppl. Ser.* **127**, 497-504 (1998)

Electrical Transport in Nanosytems

Prof. Nicolás Agraït

Associated Senior Scientist
Ph.D: UNED, Spain
Double Affiliation: Universidad Autónoma de Madrid. Spain

Nicolás Agraït got a Ph. D. in Physics from the UNED. He is Full Professor since 2007 at the Condensed Matter Physics Department of the UAM and Senior Associated Researcher at IMDEA-nanoscience. He is well-known for his pioneering work in quantum transport and forces in atomic-sized contacts and atomic chains, and has over 80 publications in peer-reviewed journals summing over 5,200 citations. Prof Agraït and collaborators have developed several novel local-probe systems for these measurements. They have very recently applied these techniques to single molecules successfully measuring electrical and thermal transport.

Research lines

- Transport through single molecules. Systematic study of electrical and thermal transport properties at the single molecule level using STM.
- Atomically-thin crystals. Study of local mechanical and electronic properties of graphene and dichalcogenide crystals, using STM and AFM
- Single molecule magnets. Study of the influence of substrate, including graphene and semiconducting atomically-thin crystals, on their magnetic properties using STM at low temperature.

Relevant publications

- "Engineering the Thermopower of C60 Molecular Junctions" Evangeli C. et col. *Nano Lett.*, 2013, 2141-2145
- "Quantum Properties of Atomic-Sized Conductors" N. Agrait et col. *Phys. Reps.* **377**, 381-380 (2003)
- "Formation and Manipulation of a Metallic Wire of Single Gold Atoms" A.I. Yanson et col. *Nature* **395**, 783-785 (1998)

Laura Rincón

PhD student

Fabrication and Physical Properties of Superconducting/Magnetic Nanostructures

Dr. Elvira M. González

Associated Scientist
Ph.D: Universidad Complutense de Madrid
Double Affiliation: Universidad Complutense de Madrid

Elvira M. González got her Ph.D. in Physics from Universidad Complutense de Madrid (UCM) in 1998 with a work on high–T_c superconducting films and superlattices, which was awarded with the Premio Extraordinario de Doctorado. She worked on structural characterization of superlattices at University of California San Diego with Prof. Ivan K. Shuller. After this, she worked on magnetotuneling in 2DEG with Prof. Emilio E. Mendez in the University of New York at Stony Brook with a NATO postdoctoral fellowship. In 2001, she got a Ramón y Cajal research fellow at Facultad de Ciencias Físicas (UCM) to work in the fabrication of ordered nanostructures. Currently, she is Associated Professor in the Departamento de Física de Materiales (UCM) and in 2013 she joined IMDEA-Nanociencia as an Associated Scientist.

Research lines

- Fabrication and structural characterization of nanostructures.
- Transport and magnetic properties of superconducting/magnetic hybrids.
- Low temperature properties of mesoscopic systems.

Relevant publications

- "Control of Dissipation in Superconducting Films by Magnetic Stray Fields" A. Gómez et col. *Appl. Phys. Lett.* **102**, 052601 (4pp) (2013)
- "Control of the Chirality and Polarity of Magnetic Vortices in Triangular Nanodots" M. Jaafar et col. *Phys. Review B* **81**, 054439 (11pp) (2010)
- "Superconducting Vortex Pinning with Artificial Magnetic Nanostructures" M. Velez et col. *J Magn Magn Mater* **320**, 2547-2562 (2008).

Nanodevices based on 2D Materials

Andrés Castellanos-Gómez
Visiting researcher
Ph.D: Universidad Autónoma de Madrid. Spain
Previous Position: Delft University of Technology, The Netherlands

Andrés Castellanos-Gómez (Spanish, 1983) obtained his Physics Degree from the Universidad Complutensde of Madrid in 2006. His PhD (Cum Laude and "Extraordinary Award", March 2011) was carried out at the Condensed Matter Department of the Autonoma University of Madrid. His PhD work was devoted to the study of the electrical and mechanical properties of atomically thin materials (such as graphene, MoS2 and mica) by scanning probe microscopy techniques. During his postdoctoral stay (May 2011 - Apr 2015) at the internationally renowned Kavli Institute of NanoScience in Delft University of Technology (The Netherlands) he was in charge of the research on optoelectronic and electromechanic properties of nanodevices based on 2D materials in Prof. Herre van der Zant's group. Since Sep 2014 A.C-G. joined IMDEA Nanoscience as visiting scientist.

He received the Young Researcher Award 2012/2013 given by the Grupo Español del Carbón, the Young Researcher Award 2013 given by the Instituto Universitario de Materiales (Alicante University) and the Joseph Wang Award 2015 for Young Researchers in Nanoscience by the Cognizure publishing group. A.C-G. research is funded by a prestigious Individual Marie Curie Fellowship (180 k , 2013-2015) and a very competitive fellowship of the BBVA Foundation (40 k , 2015).

Relevant publications

- "Photovoltaic effect in few-layer black phosphorus PN junctions defined by local electrostatic gating" M. Buscema et col. *Nature Commun.* 2014 **5**, nº 4651
- "Local Strain Engineering in Atomically Thin MoS2" Letter Andres Castellanos-Gomez et col. *Nano Lett.*, 2013, **13**, pp 5361–5366
- "Elastic Properties of Freely Suspended MoS_2 Nanosheets" Andres Castellanos-Gomez et col. *Adv. Mater.* 2012 , **24** ,772–77

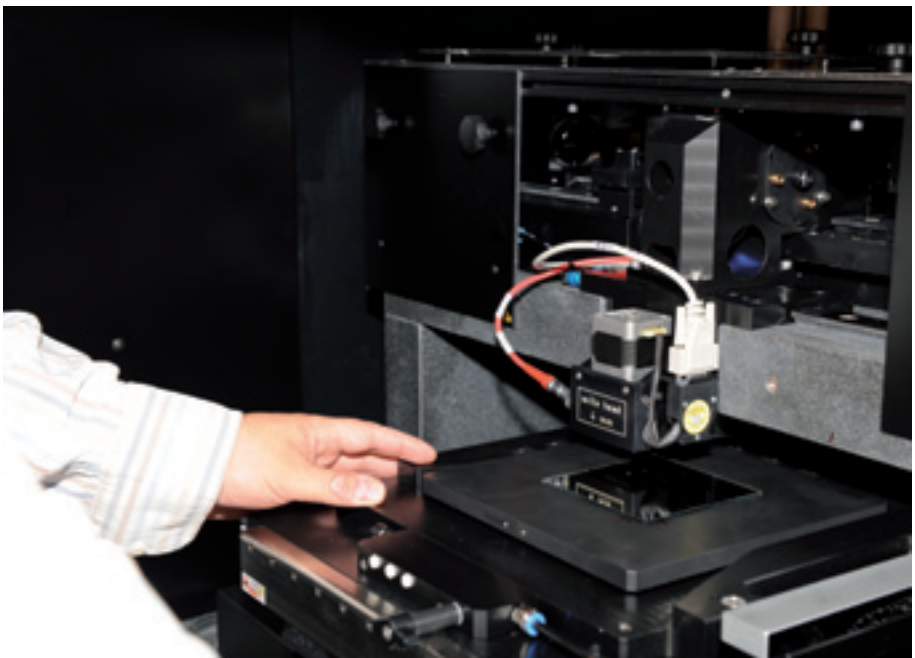
programme 6

nanosurfaces and nanodevices

This program aims at developing nanofabrication techniques and addresses new challenges in materials processing, device design and integration, opening up in this way new opportunities for applications in areas such as biomedical technology, photonics, clean energy, water management or construction.

The program leverages on nanofabrication technologies and specially focuses on cost-effective scalable process to develop new surface structured materials, to add new functionalities, or to improve those of existing materials. The special competencies within the program include surface patterning techniques such as nanoimprint lithography, soft lithography, block copolymer lithography and patterning of molecular grafts.

Particular attention is presently directed towards the development of surfaces with self-cleaning or antibacterial functionalities. In the area of photonics the properties of nano-imprinted light–emitting structures are under investigation. Another area of research focuses on the development of microfluidics devices including integrated SERS sensors and bacteria arrays for toxicology tests.



Center for Nanofabrication

Dr. Daniel Granados
Director of the Center for Nanofabrication

Dr. Daniel Granados joined IMDEA Nanoscience in September 2009. Since his arrival he has been in charge of the design and supervision of the construction works of the clean room that hosts the Centre of Nanofabrication. He has also been in charge of the acquisition and installation of the nanofabrication tools. Dr. Granados is currently the Director of the Centre of Nanofabrication. His expertise in micro and nanofabrication focuses on photonics and nano-optics devices. Recently he has started to fabricate electro- optical prototypes based on graphene and other 2D materials.

Dr. David Pérez de Lara
Researcher

Dr. David Pérez de Lara joined IMDEA Nanoscience in January 2010. Since his arrival he has been part of the micro and nanofabrication researchers' team. He contributed to the installation of the optical and electronic lithography equipments. His expertise in micro and nanofabrication focuses on superconducting-magnetic hybrid electronic devices based on a controlled and directional vortex motion superconducting detectors and superconducting Josephson junctions.

Dr. Manuel Rodríguez
Research Staff
Ph. D. Universidad Santiago de Compostela, Spain

Micro and Nanoscale Fluidic systems

Dr. Isabel Rodríguez

Senior Researcher

PhD: National University of Singapore

Previous Position: Institute of Materials Research and Engineering (IMRE)

Isabel Rodríguez graduated in Pharmacy from the University of Alcala de Henares and received a PhD in Science from the National University of Singapore in 1999. After her PhD, she worked at the Institute of Materials Research and Engineering (IMRE), A*STAR, Singapore where she became a senior member of IMRE's Patterning and Fabrication Group and led a number of research projects funded by both the public and private sectors. In 2013 she jointed IMDEA-Nanoscience as a Senior Researcher and currently she works in areas related to the application of micro and nano fabrication technologies on polymeric materials to construct functional surfaces for the control of interfacial interactions, cell adhesion and sensing.

Research lines

- Micro and nano fabrication of soft materials and applications in miniaturized (bio) analytical systems, lab-on-chip devices, micro- and nano-scale platforms for single-cell manipulation and surfaces for biomedical applications.

Relevant publications

- "Microfluidic Cell Trap Array for Controlled Positioning of Single Cells on Adhesive Micropatterns" Lin, Laiyi et col. *Lab on Chip,* 2013, **13**, 714-721
- "Fabrication and Analysis of Gecko-Inspired Hierarchical Polymer Nanosetae" Ho, Audrey Yoke Yee et col. *ACS Nano,* 2011, **5**, pp 1897-1906
- "The Effect of Topography of Polymer Surfaces on Platelet Adhesion" Li Buay Koh et col. *Biomaterials,* **31**, 1533-1545 (2010).

Relevant patents

- Super-Hydrophobic Hierarchical Structures, Method of Forming Them and Medical Devices Incorporating Them. *US pat Application no: No. 13/441,496. Filing date: April 6, 2012*
- Super-Hydrophilic Structures. US pat Application no: No. 13/435544. Filing date: March 30, 2012
- High aspect ratio adhesive structure and a method of forming the same *PCT/SG2010/000056, US 2011/0300339 A1. Filing date: 12 Feb 2010*
- A Substrate Having a Surface for Inhibiting Adhesion of a Target Cell Thereon and a Method of Preparing the Same, *PCT patent application, PCT/SG2009/00035 Filing Date: 24-Sep-09*

Felipe Viela

Ph.D. student

Ramón Barato

Internship

Soft Robotics

Dr. Ramsés V. Martínez

PhD: Universidad Autónoma de Madrid, Spain

Previous Position: Harvard University, USA

Dr. Ramsés V. Martínez obtained Bachelor's and Master's degrees in Physics at the Autonomous University of Madrid (UAM). In both cases he wrote a thesis on novel nanofabrication techniques under the supervision of Prof. Ricardo Garcia. During the last year of his PhD, he spent 3 months at the Department of Material Science and Engineering at Massachusetts Institute of Technology (MIT), participating in the activities of Prof. Stellacci's research team. He has recently received a joint European doctoral degree in Physics from the Autonomous University of Madrid and the European Commission. He currently holds a three-year International Outgoing Fellowship (IOF) at Harvard University-IMDEA Nanociencia and works in the Whitesides' research group (Nanofabrication Team).

Relevant publications

- "Rapid Fabrication of Pressure-driven Open-Channel Microfluidic Devices in Omniphobic RF Paper" Ana C. Galvan et col. *Lab on Chip,* 2013, **13**, 2922-2930
- "Separation of Nanoparticles in Aqueous Multiphase Systems through Centrifugation" Ozge Akbulut et col. *Nano Lett.,* 2012, **12**, 4060-4064
- "Elastomeric Origami: Programmable Paper-Elastomer Composites as Pneumatic Actuators" Ramses V. Martinez et col. *Adv. Funct. Mater.* 2012, **22**, 1376-1384.

programme 7
nanomedicine

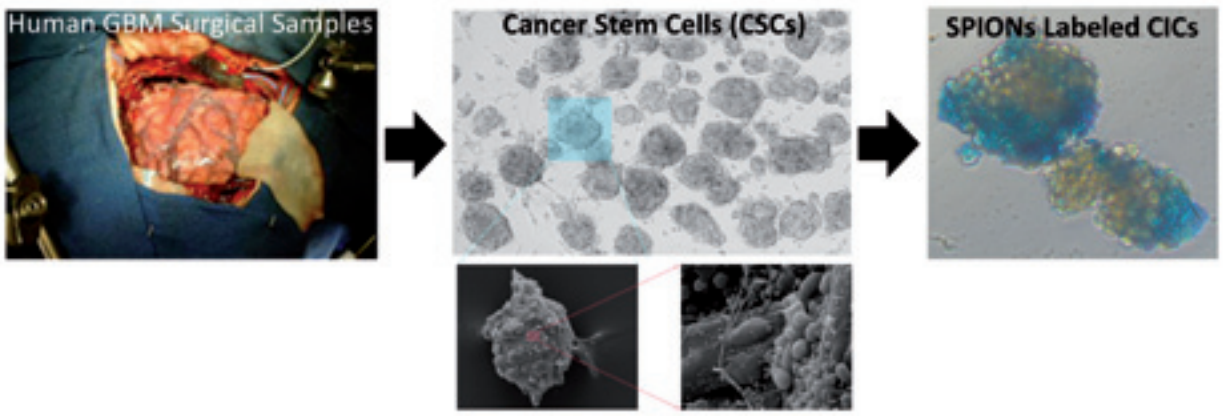
IMDEA Nanoscience's activity in nanomedicine focuses on the development of novel nanotechnologies for medical applications that will result in better, more efficient, and cost-effective tools and devices.

Researchers at IMDEA Nanoscience are developing distinct diagnostic tools, including nucleic acid-based and nanoparticle-based sensors for detection of biological targets of medical interest, and magnetic nanoparticles to be used in medical imaging as high-sensitive contrast agents.

One of our research lines is devoted to the design of Multi-Functionalised Gold and Magnetic Nanoparticles as therapeutic tools. IMDEA Nanociencia is leading the design of functionalised nanoparticles that can selectively target tumours for multimodal treatment, combining magnetic hyperthermia with intracellular drug delivery.

Another area of expertise is the development of nano-engineered surfaces for medical applications. In particular, bio-inspired nanostructures with antibacterial properties are being investigated as promising avenues to avoid infection associated with the use of medical tools or devices.

Nano-engineered surfaces are also being developed to control the behaviour of cultured cells to promote favourable biological responses such as faster tissue regeneration or better implant integration.



Engineering Biofunctional Nanostructures

Dr. Aitziber L. Cortajarena

Senior Researcher

Ph.D.: Universidad del País Vasco, Spain

Previous Position: Yale University, USA

Dr. A. L. Cortajarena earned her Ph.D. in Biochemistry from the Universidad del País Vasco in 2002. Then, she joined the group of Prof. L. Regan at Yale University, USA, as a Postdoctoral Fellow. She worked on protein design, structure, and function. In 2006, she was Visiting Scientist at the Weizmann Institute, Israel, working on single molecule spectroscopy. Then, continued her work at Yale University, as an Associate Research Scientist with Prof. Regan. She joined IMDEA Nanociencia as Group Leader in January 2010. Her research focuses on protein design toward the application of novel protein-based nanostructures in nanotechnology, and on the generation of biofunctional nanostructures and platforms and their applications in nanomedicine.

Research lines

- Bio-functionalization of magnetic nanoparticles for cancer treatment and diagnosis.
- Polymer surface bio-functionalization for biosensors applications.
- Protein Engineering and Biofunctional Nanostructures.
- Self-assembly of designed proteins into ordered nanostructures and biomaterials.

Relevant publications

- "Controlled nanometric fibers of self-assembled designed protein scaffolds S. H. Mejias et col. *Nanoscale* 2014, **6**, 10982-8 (2014)
- "Multifunctionalization of magnetic nanoparticles for controlled drug release: a general approach" A. Latorre et col. *Eur J Med Chem.* 2014 **82**:355-62
- "Honeycomb Patterned Surfaces Functionalized with Polypeptide Sequences for Recognition and Selective Bacterial Adhesion" A.Sanz de León et col. *Biomaterials,* **34**, 1453-60 (2013)

Dr. Pierre Couleaud

Postdoc

CNRS Nancy University, France

Sara H. Mejías

Ph.D. student

Diana González

Master student

Victoria Bayón

Master student

David Romera

internship

Jael Fernández

internship

Sergio Adán

Internship

Modified Oligonucleotides in Nanobiomedicine: RNA interference and sensors

Dr. Álvaro Somoza

Senior Researcher

Ph.D.: Universidad Autónoma de Madrid, Spain

Previous Position: Instituto de Investigaciones Biológicas (IRB-Barcelona), Barcelona. Spain

Álvaro Somoza studied Chemistry at Universidad Autónoma de Madrid where he did his PhD, under the direction of Prof. Carmen Carreño, focused on the total synthesis of Rubiginones. He then joined the group of Prof. Eric Kool at Stanford University. There he worked on a project focused on the use of modified oligonucleotides to study the role of sterics and hydrogen bonding interactions in RNA interference. Later, he moved to Barcelona to work with Dr. Ramón Eritja at the IRB, where he started a project devoted to the study of the interactions between RNA strands and the protein involved in RNA interference. He is junior scientist at IMDEA since 2009.

Research lines

- The research of Dr. Somoza is focused on the preparation of modified oligonucleotides functionalization of nanoparticles for different applications. Particularly, modified RNAs are prepared to study RNA interference and to modify gold nanoparticles to improve their delivery. On the other hand, DNA is used to assemble nanostructures for different applications such as sensors.
- In addition, gold and magnetic nanoparticles are modified with different linkers to ease their functionalization with different biomolecules or drugs for the treatment of cancer.

Relevant Publications

- "Single-point Mutation Detection in RNA Extracts using Gold Nanoparticles Modified with Hydrophobic Molecular Beacon-like Structures" A. Latorre et col. *Chem. Commun.,* 2014, **50**, 3018-3020
- "DNA and aptamer stabilized gold nanoparticles for targeted delivery of anticancer therapeutics" A. Latorre et col. *Nanoscale* 2014, **6**, 7436–7442
- "Glutathione-Triggered Drug Release from Nanostructures" A Latorre, Á Somoza *Curr. Top. Med. Chem.* 2014, **14**, 2662-2671

Dr. Alfonso Latorre

Postdoc

Universidad Autónoma de Madrid, Spain

Siamak Javani

Ph.D. student

Romina Lorca

Ph.D. student

Ewa Gall

Master student

Sergio Adán

Internship

Ana Latorre

Internship

Beatriz Sánchez

Internship

Magnetic Nanoparticles in Biomedical Applications

Dr. Francisco Terán

Researcher

Ph.D.: Université Joseph Fourier-Grenoble I, France

Previous Position: Centro Tecnológico Gaiker. Fundación Gaiker. Spain

Graduated in Physics from the Universidad Autónoma de Madrid in 1997, Francisco Terán got a Ph.D. in Physics from the Université Josep Fourier in 2001. Dr. Terán is integrated into the Nanomedicine Programme. Since April 20009, Dr. Terán is interested on the dynamical magnetic response of iron oxide nanoparticles for biomedical applications. Currently, his scientific interest relies on three issues: i) the determination of the influence of biological matrices on magnetism of magnetic nanoparticles, ii) the use of magnetic signal in biomolecule sensoring applications, iii) the use of magnetic hyperthermia in therapeutical purposes.

Research lines

- The influence of biological matrices on the dynamical magnetic response of magnetic nanoparticles.
- The influence of biological fluids on the dynamical magnetic response of magnetic nanoparticles.
- The influence of magnetic heating on cancer cell viability and tumor regression.
- Development of AC magnetic field applicators for *in vitro* and *in vivo* studies.
- Development of biomolecule magnetic sensors.

Relevant Publications

- "High Therapeutic Efficiency of Magnetic Hyperthermia in Xenograft Models Achieved with Moderate Temperature Increases in the Tumor Area" S. Kossatz et col. *Pharm. Res.* **31**, 3274 (2014)
- "Modulation of Magnetic Heating via Dipolar Magnetic Interactions in Monodisperse and Crystalline Iron Oxide Nanoparticles" G.Salas et col. *J. Phys. Chem. C* **18**, 19985 (2014)
- *"Controlled Synthesis of Uniform Magnetite Nanocrystals with High-quality Properties for Biomedical Applications"* G. Salas, et al. *J. Mater. Chem.* **22**, 21065 (2012)
- "Accurate determination of the specific absorption rate in superparamagnetic nanoparticles under non-adiabatic conditions" F.J. Teran, et al. *Appl. Phys. Lett.* **101**, 062413 (2012)

Synthesis of Magnetic Nanoparticles

Dr. Gorka Salas

Researcher

Ph.D.: Universidad de Valladolid, Spain.

Previous Position: Laboratoire de Chimie Organométallique de Surface (CNRS), Lyon, France.

Gorka Salas obtained his PhD in Chemistry (2007) at the Universidad de Valladolid, under the supervision of Prof. Pablo Espinet and Juan A. Casares, working on the field of transition metal organometallic compounds and homogeneous catalysis. Then he joined the group of Bruno Chaudret and Karine Philippot at the Laboratoire de Chimie de Coordination (CNRS), in Toulouse, to work in the synthesis and application in catalysis of metal nanoparticles in ionic liquids. This work continued in the Laboratoire de Chimie Organométallique de Surface, (CNRS), in Lyon. Since 2011 he works at IMDEA Nanociencia in the synthesis of metal oxide nanoparticles for biomedical applications.

Research lines

- Synthesis of magnetic nanoparticles with relevant properties for different applications, with special focus in biomedicine (as magnetic hyperthermia mediators, drug carriers and contrast agents for imaging).
- Surface modification of the nanoparticles with functional molecules for different purposes. This research is mainly focused in the use of different coatings to provide biocompatibility and functionality to the nanoparticles, allowing them to be used in biomedical applications.

Relevant Publications

- "Controlled Synthesis of Uniform Magnetite Nanocrystals with High-quality Properties for Biomedical Applications" Salas, G. et col. *J. Mater. Chem.* **22**, 21065-21075 (2012)
- "Influence of Amines on the Size Control of *in situ* Synthesized Ruthenium Nanoparticles in Imidazolium Ionic Liquids" Salas, G. et col. *Dalton Trans.* **40**, 4660-4668 (2011)
- "Insights into the Mechanism of the Negishi Reaction: ZnRX Reagents versus ZnR_2" Casares, J. A et col. *J. Am. Chem. Soc.*, **2007**, 129, 3508-3509

Paloma Rodríguez

Internship

Jesús Benavides

Internship

Magnetic Nanoparticles in Biomedical Applications

Dr. Daniel Ortega

Researcher

Ph.D.: University of Cádiz, Spain

Previous Position: University College London. United Kingdom

Daniel Ortega received both MSc and PhD degrees in 2003 and 2007 at the University of Cádiz, where he successfully developed transparent magnetic nanocomposites with application in magneto-optical sensors. He undertook his first postdoctoral position at the Uni-versity of the Basque Country in 2008 researching unusual magnetic proper- ties in metallic and diluted magnetic semiconductor nanoparticles. Starting in 2009, he joined the The Royal Institution of Great Britain and the Physics department at University College London, first as a Marie Curie postdoctoral fellow and thereafter as a research asso- ciate, to work in the field of healthcare biomagnetics. During this period he was awarded an honorary research associate position at the London Centre for Nan- otechnology. He is focused in bespoke magnetic nanoparticles with applications in biomedicine and developing new instrumental methods for their characterisation. Working on the same topics, he was appointed to the Toyohashi University of Technology in 2013 for a short spell. Since late 2013 he joined IMDEA Nanoscience, also holding an honorary position at the UCL Institute of Biomedical Engineering.

Research lines

- Magnetic nanostructures for magnet ic hyperthermia, tissue engineering and cell therapies.
- Nanoscopy techniques for magnetically modified cells and biological constructs.
- Next-generation magnetocaloric materials.

Relevant Publications

- "Magnetic hyperthermia "Ortega, D.; Pankhurst, Q. A. In *Nanoscience: Volume 1: Nanostructures through Chemistry*, O'Brien, P., *Ed. Royal Society of Chemistry: Cambridge, 2012; Vol. 1, pp 60-88.*
- "Superparamagnetic iron oxide nanoparticle targeting of MSCs in vascular injury" Riegler, J. et col. *Biomaterials,* **34**, 1987-1994(2013)
- "Rapid magnetic cell delivery for large tubular bioengineered constructs Gonzalez-Molina" Gonzalez-Molina, J. et col. *J R Soc Interface.* 2012, **6**, 3008 (8pp)

Metallodrugs to Modulate Tumour Cell Machinery

Dr. Ana Pizarro

Researcher

Ph.D.: Universidad Autónoma de Madrid, Spain

Previous Position: University of Warwick (UK)

Dr Ana Pizarro completed a PhD in Chemistry at the Universidad Autónoma de Madrid in 2004 under the supervision of Prof. C. Navarro-Ranninger. In 2004 she was awarded a Marie Curie Fellowship (EIF) to work in the laboratory of Prof P. J. Sadler FRS at the University of Edinburgh (UK) on new organometallic drugs. She moved to the University of Warwick (UK) in 2007 where she focused on how selected metallodrugs exert their anticancer effects in tumour cells. In January 2014 she joined IMDEA Nanoscience as a Ramón y Cajal Fellow.

Research Lines

- Our ultimate goal is to generate metal-based drugs whose mechanism of action is understood and whose targets are identified. These metallo-medicines will exploit the extraordinary features of transition metal complexes, in particular the capability for in tumour activation, and the possibility of being loaded into nanocarriers to confer control on the drug's release and reactivity.

Relevant Publications

- "The Potent Oxidant Anticancer Activity of Organoiridium Catalysts" Z. Liu et col. *Angew. Chem. Int. Ed.* 2014, **53**, 3941-3946.
- This work has recently received media attention: http://www.bbc.com/news/uk-england-coventry-warwickshire-26837963.
- "Cancer Chemistry: Designing New Drugs for Cancer Treatment" (Chapter 15) in *The Molecular Biology of Cancer. A bridge from Bench to Bedside*, 2nd Edition. Ana M. Pizarro and Peter J. Sadler. Editors: Stella Pelengaris and Michael Khan, John Wiley & Sons, *Inc (2013), pp. 436-460.*
- "Activation Mechanisms for Organometallic Anticancer Complexes" in *Medicinal Organometallic Chemistry* (Vol 32), in *Topics in Organometallic Chemistry*. Ana M. Pizarro, Abraha Habtemariam and Peter J. Sadler. Editors: Gérard Jaouen and Nils Metzler-Nolte, *Springer-Verlag, Berlin, Heidelberg, Germany (2010), 21-56.*

Francisco Martínez

Ph.D. student

Magnetic Nanoparticles in Biomedicine. Cell-particle Interactions

Prof. Ángeles Villanueva

Associated Senior Scientist
Ph.D.: Universidad Autónoma de Madrid, Spain
Double Affiliation: Universidad Autónoma de Madrid, Spain

Dr. Ángeles Villanueva is a cell biologist. Her research is mainly focused on photodynamic therapy of cancer. In the last years, she has established new collaborations with research groups in the field of magnetic nanoparticles with applications in Medicine. She has stud ied in cell cultures: i) the mechanisms of nanoparticles internalization; ii) their subcellular localization; iii) the nano- particles biocompatibility; and iv) the identification the cell death mechanism induced by heat-controlled intracellular hyperthermia with magnetic nanoparti- cles and an alternating magnetic field.

Research lines

- Medical applications of nanoparticles. Cell cultures.
- Biocompatibilty of magnetic nanoparticles.
- Mechanisms of cell death.
- Alterations in adhesion and cytoskeletal proteins.
- Liposomal drug delivery.
- Evaluation in cell cultures and in vivo experimental models of new antitumor agents.
- Signaling pathways involved in cell death.

Relevant Publications

- "Photodynamic effects on culure tumor cells. Cytoskeleton alterations and cell death mechanisms" Villanueva A. et. col *In Handbook of Photochemistry and Photobiology. Vol: 4, pp: 79-117. 2003. (Ed. H. S. Nalwa). American Scientific Publisher. California, USA*
- "Morphological criteria to distinguish cell death induced by apoptotic and necrotic treatments" Villanueva A. et. col *Apoptosis* 10: 201-8, 2005
- "The influence of surface functionalization on the enhanced internalization of magnetic nanoparticles in cancer cells" Villanueva A. et col. *Nanotechnology* **20,** 115103-115111, 2009

Macarena Calero

Ph .D. student

New Therapeutic Approaches on Neuro-Oncology

Dr. Ángel Ayuso-Sacido

Associated Scientist
Ph.D.: Merck Sharp and Dhome, Spain
Double Affiliation: Hospital de Madrid Foundation, Spain

Dr. Ayuso-Sacido made his PhD at Merck Sharp and Dhome (MSD) and worked as a postdoctoral fellow within the Medicine Department at Mount Sinai School of Medicine and the Neurosurgery Department at Cornell Medical Center. He come back to Spain and worked as Senior Researcher at Centro de Investigación Príncipe Felipe (CIPF) de Valencia and co-founded the Glioblastoma Spanish Network (REIG). Afterwards, he was Visiting Scientist at Helsinki University and currently, he is the Director of the Brain Tumour Laboratory at Hospital de Madrid Foundation, Associated Scientist at CEU-San Pablo University and IMDEA nanoscience and President of the REIG.

Relevant Articles:

- "Engineering iron oxide nanoparticles for clinical settings" Aitziber L. Cortajarena et col. *Nanobiomedicine.* 2014 1:2.
- "DYRK1A inhibition Impairs EGFR Stability and affects the expansion of tumor initiating cells in receptor-depending glioblastomas" Natividad Pozo et col. *J. Clinical Investigation* 2013, **123**: 2475-87.
- "Reversible neural stem cell niche dysfunction in a model of multiple sclerosis" A Ayuso-Sacido et col. *Annals of Neurology,* 2011, **69**:878-91

Dr. Sandra Milena Ocampo

Postdoc
Instituto de Química Avanzada de Cataluña (IQAC-CSIC) Barcelona, Spain

Noemí García

Ph.D. student

Carlos Rodríguez

Master student

research staff

Dr. Santiago Casado
Ph. D. Universidad de Cantabria, Spain

Dr. Antonio Aires
Ph. D. Universidad Autónoma de Madrid, Spain

Dr. Manuel Rodríguez
Ph. D. Universidad de Santiago, Spain

Dr. Vanessa Rodríguez
Ph. D. Universidad Autónoma de Madrid, Spain

Dr. Javier López Ogalla
Ph. D. Universidad Autonoma de Madrid, Spain

Dr. Adriana Arnaiz
Ph. D. University of Cambridge, UK

Rebeca Amaro
Technician

Warren Smith
Technician

Jorge Moreno
Technician

David Cabrera
Technician

Sara de Lorenzo
Technician

Leonor de la Cueva
Technician

management

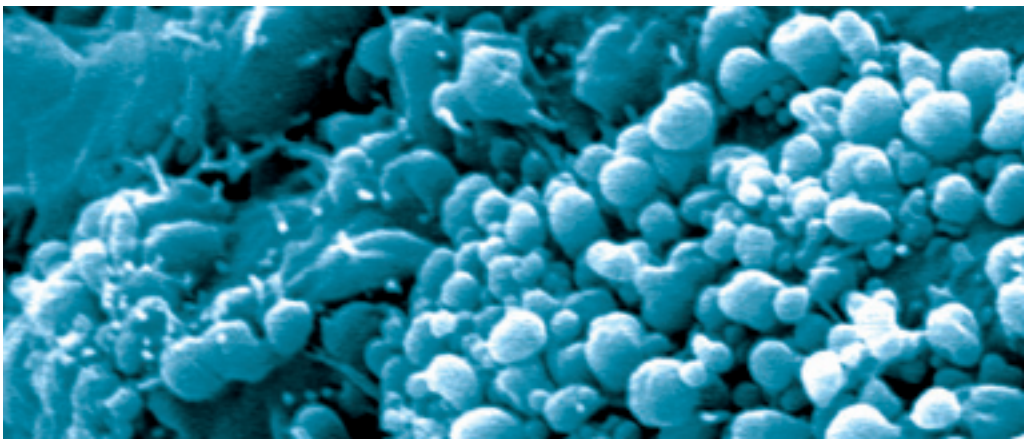
Dr. José Luis Casillas
General Manager

Dª Isabel Rodríguez
MS in Administration, Administration and Finance Manager

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

D. Bonifacio Vega
MSc, MBA, Technology Transfer and Business Development Manager

Dª Patricia López
Project Assistant



Dr. David Sayago
POCAONTAS Project Manager

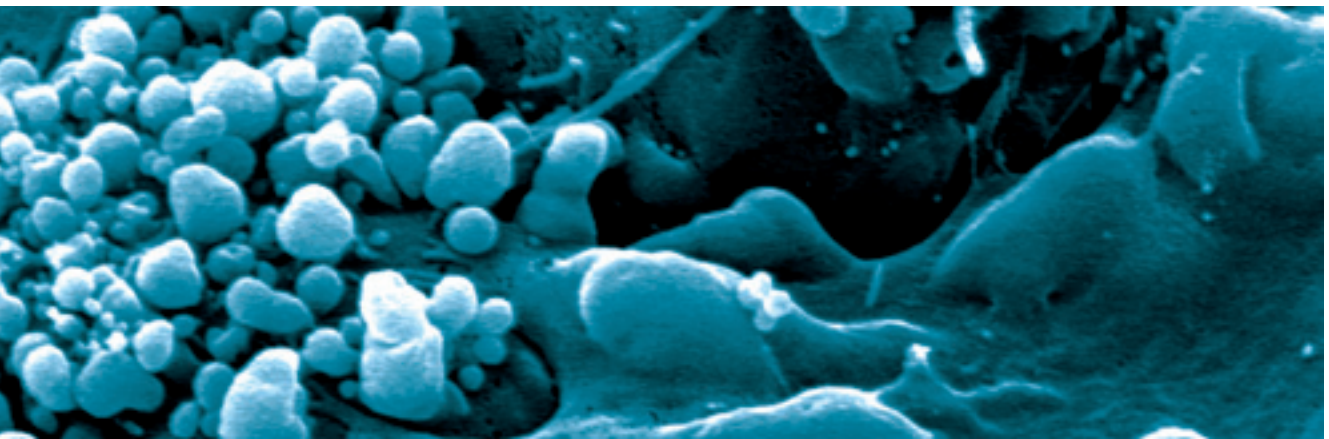
Dª Paloma Macua
Administrative Assistant

D. Óscar Bodas
Network and Systems Manager

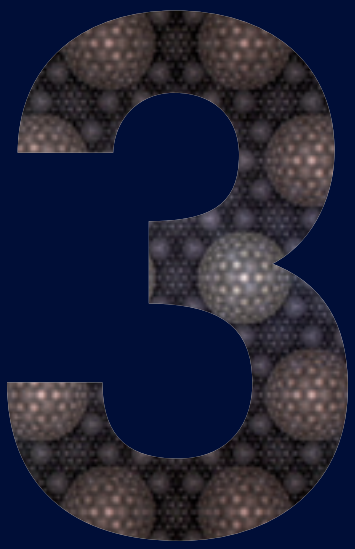
Dr. Mark William Davies
Transfer and Business Development Consultant

Dª Elena Pérez
Administrative Assistant

Dª Juana Hemoso
Administrative Project Assistant



scientific report



annual report 2014

3.1. Publications, contributions to books and patents

3.1.1. Publications

1. **Energy Transfer at the Zeolite L Boundaries: Towards Photo- and Electroresponsive Materials**. Cucinotta, F., Guenet, A., Bizzarri, C., Mróz, W., Botta, C., Milián-Medina, B., Gierschner, J. & De Cola, L. *ChemPlusChem* (2014). **79** (1), 45--57. (Doi: 10.1002/cplu.201300272.)

2. **Buckyballs.** Delgado, J. L., Filippone, S., Giacalone, F., Herránz, M. A., Illescas, B., Pérez, E. M. & Martín, N. *Top. in Curr.Chem* (2014). **350**, 1--64. (Doi: 10.1007/128_2012_414.)

3. **Quantitative decoding of interactions in tunable nanomagnet arrays using first order reversal curves.** Gilbert, D. A., Zimanyi, G. T., Dumas, R. K., Winklhofer, M., Gómez, A., Eibagi, N., Vicent, J. L. & Liu, K. *Sci. Rep.* (2014). **4**, 4204. (Doi: 10.1038/srep04204.)

4. **Organocatalysis for new chiral fullerene-based materials**. Girón, R. M., Reboredo, S., Marco-Martnez, J., Filippone, S. & Martín, N. *Faraday discussions* (2014). **173**, 311--22. (Doi: 10.1039/c4fd00065j.)

5. **Omniphobic "RF Paper" Produced by Silanization of Paper with Fluoroalkyltrichlorosilanes**. Glavan, A. C., Martínez, R. V., Subramaniam, A. B., Yoon, H. J., Nunes, R. M. D., Lange, H., Thuo, M. M. & Whitesides, G. M. *Adv. Funct. Mater.* (2014). 24 (1), 60--70. (Doi: 10.1002/adfm.201300780.)

6. **Electrografting of N', N'-dimethylphenothiazin-5-ium-3,7-diamine (Azure A) diazonium salt forming electrocatalytic organic films on gold or graphene oxide gold hybrid electrodes.** Gómez-Anquela, C., Revenga-Parra, M., Abad, J., Marín, A. G., Pau, J., Pariente, F., Piqueras, J. & Lorenzo, E. *Electrochim. Acta* (2014). **116**, 59--68. (Doi: 10.1016/j.electacta.2013.11.021.)

7. **Laser heating tunability by off-resonant irradiation of gold nanoparticles.** Horme o, S., Gregorio-Godoy, P., Pérez-Juste, J., Liz-Marzán, L. M., Juárez, B. H. & Arias-González, J. R. *Small* (2014). **10** (2), 376--84. (Doi: 10.1002/smll.201301912.)

8. **Rationally designed molecular D–A–D triad for piezochromic and acidochromic fluorescence on–off switching.** Kwon, M. S., Gierschner, J., Seo, J. & Park, S. Y. *J. Mat. Chem. C* (2014). **2** (14), 2552. (Doi: 10.1039/c3tc31938e.)

9. **Controlling the crystalline three-dimensional order in bulk materials by single-wall carbon nanotubes.** López-Andarias, J., López, J. L., Atienza, C., Brunetti, F. G., Romero-Nieto, C., Guldi, D. M. & Martín, N. *Nature Commun.* (2014). **5**, 3763. (Doi: 10.1038/ncomms4763.)

10. **Self-assembly and characterization of small and monodisperse dye nanospheres in a protein cage.** Luque, D., de la Escosura, A., Snijder, J., Brasch, M., Burnley, R. J., Koay, M. S. T., Carrascosa, J. L., Wuite, G. J. L., Roos, W. H., Heck, A. J. R., Cornelissen, J. J. L. M., Torres, T. & Castón, J. R. *Chem. Sci.* (2014). **5** (2), 575. (Doi: 10.1039/c3sc52276h.)

11. **Synthesis and characterization of bis-[PcRu(CO)][$Ru_2(ap)_4(C{\equiv}CC_5H_4N)_2$]**. Manowong, M., Van Caemelbecke, E., Rodríguez-Morgade, M. S., Bear, J. L., Kadish, K. M. & Torres, T. *J. Porphyr. Phthalocya.* 2014). 18, 49--57. (Doi10.1142/S1088424613501228.)

12. **Catalytic stereodivergent functionalization of $H_2@C_{60}$**. Maroto, E. E., Izquierdo, M., Murata, M., Filippone, S., Komatsu, K., Murata, Y. & Martín, N. *Chem. Commun.* (2014). **50** (6), 740--2. (Doi: 10.1039/c3cc46999a.)

13. **The reorganization energy of intermolecular hole hopping between dyes anchored to surfaces**. Moia, D., Vaissier, V., López-Duarte, I., Torres, T., Nazeeruddin, M. K., O'Regan, B. C., Nelson, J. & Barnes, P. R. F. *Chem. Sci.* (2014). **5** (1), 281. (Doi: 10.1039/c3sc52359d.)

14. **SOX2+ cell population from normal human brain white matter is able to generate mature oligodendrocytes**. Oliver-De La Cruz, J., Carrión-Navarro, J., García-Romero, N., Gutiérrez-Martín, A., Lázaro-Ibáñez, E., Escobedo-Lucea, C., Perona, R., Belda-Iniesta, C. & Ayuso-Sacido, A. *PloS one* (2014). **9** (6), e99253. (Doi: 10.1371/journal.pone.0099253.)

15. **Unusual Demetalation and Ordered Adsorption of a Pyridine-Appended Zinc Phthalocyanine at Metal-Electrolyte Interfaces Studied by in Situ Scanning Tunneling Microscopy and X-ray Photoelectron Spectroscopy.** Phan, T. H., Breuer, S., Hahn, U., Pham, D. T., Torres, T. & Wandelt, K. *J. Phys. Chem. C* (2014). **118** (1), 457--467. (Doi: 10.1021/jp410002p.)

16. **Attosecond vacuum UV coherent control of molecular dynamics.** Ranitovic, P., Hogle, C. W., Rivière, P., Palacios, A., Tong, X.-M., Toshima, N., González-Castrillo, A., Martín, L., Martín, F., Murnane, M. M. & Kapteyn, H. *Proc. Natl. Acad. Sci. USA* (2014). **111** (3), 912--7. (Doi: 10.1073/pnas.1321999111.)

17. **Creating and testing carbon interfaces - integrating oligomeric phthalocyanines onto single walled carbon nanotubes.** Strau , V., Gallego, A., de la Torre, G., Chamberlain, T. W., Khlobystov, A. N., Torres, T. & Guldi, D. M. *Faraday discussions* (2014). **172**, 61--79. (Doi: 10.1039/c4fd00063c.)

18. **Thermodynamically stable [4 + 2] cycloadducts of lanthanum-encapsulated endohedral metallofullerenes.** Takano, Y., Nagashima, Y., Herranz, M. Á., Martín, N. & Akasaka, T. *Beilstein J. Org. Chem.* (2014). **10**, 714--21. (Doi: 10.3762/bjoc.10.65.)

19. **Charge transfer-assisted self-limited decyanation reaction of TCNQ-type electron acceptors on Cu (100).** Urban, C., Wang, Y., Rodríguez-Fernández, J., García, R., Herranz, M. Á., Alcamí, M., Martín, N., Martín, F., Gallego, J. M., Miranda, R. & Otero, R. *Chem. Commun.* (2014). 50 (7), 833--5. (Doi: 10.1039/c3cc45791e.)

20. **Exploring the retention properties of CaF_2 nanoparticles as possible additives for dental care application with tapping-mode atomic force microscope in liquid.** Wasem, M., Köser, J., Hess, S., Gnecco, E. & Meyer, E. *Beilstein J. Nanotech.* (2014). 5 (1), 36--43. (Doi: 10.3762/bjnano.5.4.)

21. **Adapting Ruthenium Sensitizers to Cobalt Electrolyte Systems**. Amit Kumar, S., Urbani, M., Medel, M., Ince, M., González-Rodríguez, D., Chandiran, A. K., Bhaskarwar, A. N., Torres, T., Nazeeruddin, M. K. & Grätzel, M. *J. Phys. Chem. Lett.* (2014). 5 (3), 501--505. (Doi: 10.1021/jz402612h.)

22. **Disclosing intrinsic molecular dynamics on the 1-fs scale through extreme-ultraviolet pump-probe measurements.** Carpeggiani, P. A., Tzallas, P., Palacios, A., Gray, D., Martín, F. & Charalambidis, D. *Phys. Rev. A* (2014). **89** (2), 023420. (Doi: 10.1103/PhysRevA.89.023420.)

23. **Molecular resolvent-operator method: Electronic and nuclear dynamics in strong-field ionization.** Catoire, F., Silva, R. E. F., Rivière, P., Bachau, H. & Martín, F. *Phys. Rev. A* (2014). **89** (2), 023415. (Doi: 10.1103/PhysRevA.89.023415.)

24. **Exchange bias effect in Au-Fe3O4 nanocomposites.** Chandra, S., Huls, N. A. F., Phan, M. H., Srinath, S., García, M. A., Lee, Y., Wang, C., Sun, S., Iglesias, & Srikanth, H. *Nanotechnology* (2014). **25** (5), 055702. (Doi: 10.1088/0957-4484/25/5/055702.)

25. **Subphthalocyanines, subporphyrazines, and subporphyrins: singular nonplanar aromatic systems.** Claessens, C. G., González-Rodríguez, D., Rodríguez-Morgade, M. S., Medina, A. & Torres, T. *Chem. Rev.* (2014). **114** (4), 2192--277. (Doi: 10.1021/cr400088w.)

26. **TorrentGuard: Stopping scam and malware distribution in the BitTorrent ecosystem**. Cuevas, R., Kryczka, M., González, R., Cuevas, A. & Azcorra, A. *Comput. Netw.* (2014). **59**, 77--90. (Doi: 10.1016/j.bjp.2013.12.007.)

27. **Out-of-plane and in-plane actuation effects on atomic-scale friction.** Fajardo, O. Y., Gnecco, E. & Mazo, J. J. *Phys. Rev. B* (2014). **89** (7), 075423. (Doi: 10.1103/PhysRevB.89.075423.)

28. **A helium atom scattering study of well-ordered TCNQ adlayers on Cu(100).** Fladischer, K., Politano, A., Ernst, W. E., Faras, D. & Miranda, R. *Surf. Sci.* (2014). **620**, 65--69. (Doi: 10.1016/j.susc.2013.09.025.)

29. **Electron transfer in a supramolecular associate of a fullerene fragment.** Gallego, M., Calbo, J., Aragó, J., Krick Calderón, R. M., Liquido, F. H., Iwamoto, T., Greene, A. K., Jackson, E. A., Pérez, E. M., Ortí, E., Guldi, D. M., Scott, L. T. & Martín, N. *Angew. Chem. Int. Ed.* (2014). **53** (8), 2170--5. (Doi: 10.1002/anie.201309672.)

30. **Fragmentation dynamics of doubly charged methionine in the gas phase.** Ha, D. T., Wang, Y., Alcamí, M., It Itälä, E., Kooser, K. Urpelainen, S., Huels, M. A., Kukk, E. & Martín, F. *J. Phys .Chem. A* (2014). **118** (8), 1374--83. (Doi: 10.1021/jp4113238.)

31. **Peripherally and axially carboxylic acid substituted subphthalocyanines for dye-sensitized solar cells.** Ince, M., Medina, A., Yum, J.-H., Yella, A., Claessens, C. G., Martínez-Díaz, M. V., Grätzel, M., Nazeeruddin, M. K. & Torres, T. *Chem. Eur. J.* (2014). **20** (7), 2016--21. (Doi: 10.1002/chem.201303639.)

32. **Time-dependent density functional theory molecular dynamics simulation of doubly charged uracil in gas phase.** López-Tarifa, P., Hervé du Penhoat, M.-A., Vuilleumier, R., Gaigeot, M.-P., Rothlisberger, U., Tavernelli, I., Le Padellec, A., Champeaux, J.-P., Alcamí, M., Moretto-Capelle, P., Martín, F. & Politis, M.-F. *Cent. Eur. J. Phys.* (2014). **12** (2), 97--102. (Doi: 10.2478/s11534-014-0428-0.)

33. **Enantioselective cycloaddition of münchnones onto [60]fullerene: organocatalysis versus metal catalysis.** Marco-Martínez, J., Reboredo, S., Izquierdo, M., Marcos, V., López, J. L., Filippone, S. & Martín, N. *J. Am. Chem. Soc.* (2014). **136** (7), 2897--904. (Doi: 10.1021/ja500071k.)

34. **Note: long-range scanning tunneling microscope for the study of nanostructures on insulating substrates.** Molina-Mendoza, A. J., Rodrigo, J. G., Island, J., Burzuri, E., Rubio-Bollinger, G., van der Zant, H. S. J. & Agraït, N. *Rev. Sci. Instrum.* (2014). 85 (2), 026105. (Doi: 10.1063/1.4864196.)

35. **Simple diazonium chemistry to develop specific gene sensing platforms.** Revenga-Parra, M., Agraït, N. García-Mendiola, T., González-Costas, J., González-Romero, E., Martín, A. G., Pau, J. L., Pariente, F. & Lorenzo, E. *Analytica chimica acta* (2014). **813**, 41--7. (Doi: 10.1016/j.aca.2014.01.026.)

36. **Lateral vibration effects in atomic-scale friction**. Roth, R., Fajardo, O. Y., Mazo, J. J., Meyer, E. & Gnecco, E. *App. Phys. Lett.* (2014). **104** (8), 083103. (Doi: 10.1063/1.4866427.)

37. **Probing the atomic structure of metallic nanoclusters with the tip of a scanning tunneling microscope.** Schouteden, K., Lauwaet, K., Janssens, E., Barcaro, G., Fortunelli, A., Van Haesendonck, C. & Lievens, P. *Nanoscale* (2014). **6** (4), 2170--6. (Doi: 10.1039/c3nr03585a.)

38. **Nanoskiving core-shell nanowires: a new fabrication method for nano-optics.** Watson, D. C., Martínez, R. V., Fontana, Y., Russo-Averchi, E., Heiss, M., Fontcuberta i Morral, A., Whitesides, G. M. & Lonar, M. *Nano letters* (2014). **14** (2), 524--31. (Doi: 10.1021/nl403552q.)

39. **Effect of Chloride Ligands on CdSe Nanocrystals by Cyclic Voltammetry and X-ray Photoelectron Spectroscopy.** de la Cueva, L., Lauwaet, K., Otero, R., Gallego, J. M., Alonso, C. & Juaréz, B. H. *J. Phys. Chem. C* (2014). **118** (9), 4998--5004. (Doi: 10.1021/jp4118425.)

40. Gold surface patterned with cyclodextrin-based molecular nanopores for electrochemical assay of transglutaminase activity. Fernández, I., Araque, E., Martínez-Ruíz, P., Di Pierro, P., Villalonga, R. & Pingarrón, J. M. *Electrochem. Commun.* (2014). **40**, 13--16. (Doi: 10.1016/j.elecom.2013.12.014.)

41. Breaking the configurational anisotropy in Fe single crystal nanomagnets. Gómez, A., Cebollada, F., Palomares, F. J., Sánchez, N., González, E. M., González, J. M. & Vicent, J. L. *Appl. Phys. Lett.* (2014). **104** (10), 102406. (Doi: 10.1063/1.4868401.)

42. Torsion and curvature of FtsZ filaments. González de Prado Salas, P., Hörger, I., Martín-García, F., Mendieta, J., Alonso, Á., Encinar, M., Gómez-Puertas, P., Vélez, M. & Tarazona, P. *Soft Matter* (2014). **10** (12), 1977--86. (Doi: 10.1039/c3sm52516c.)

43. Quantifying the atomic-level mechanics of single long physisorbed molecular chains. Kawai, S., Koch, M., Gnecco, E., Sadeghi, A., Pawlak, R., Glatzel, T., Schwarz, J., Goedecker, S., Hecht, S., Baratoff, A., Grill, L. & Meyer, E. *Proc. Natl. Acad. Sci. USA* (2014). **111** (11), 3968--72. (Doi: 10.1073/pnas.1319938111.)

44. Single-point mutation detection in RNA extracts using gold nanoparticles modified with hydrophobic molecular beacon-like structures. Latorre, A., Posch, C., Garcimartín, Y., Ortiz-Urda, S. & Somoza, Á. *Chem. Commun.* (2014). 50 (23), 3018--20. (Doi: 10.1039/c3cc47862a.)

45. Shape Evolution of CdSe Nanoparticles Controlled by Halogen Compounds. Meyns, M., Iacono, F., Palencia, C., Geweke, J., Coderch, M. D., Fittschen, U. E. A., Gallego, J. M., Otero, R., Juárez, B. H. & Klinke, C. *Chem. Mat.*(2014). **26** (5), 1813--1821. (Doi: 10.1021/cm4037082.)

46. Correlative atomic force microscopy and localization-based super-resolution microscopy: revealing labelling and image reconstruction artefacts. Monserrate, A., Casado, S. & Flors, C. *ChemPhysChem.* (2014). **15** (4), 647--50. (Doi: 10.1002/cphc.201300853.)

47. Molecular interferometer to decode attosecond electron-nuclear dynamics. Palacios, A., González-Castrillo, A. & Martín, F. *Proc. Natl. Acad. Sci. USA* (2014). **111** (11), 3973--8. (Doi: 10.1073/pnas.1316762111.)

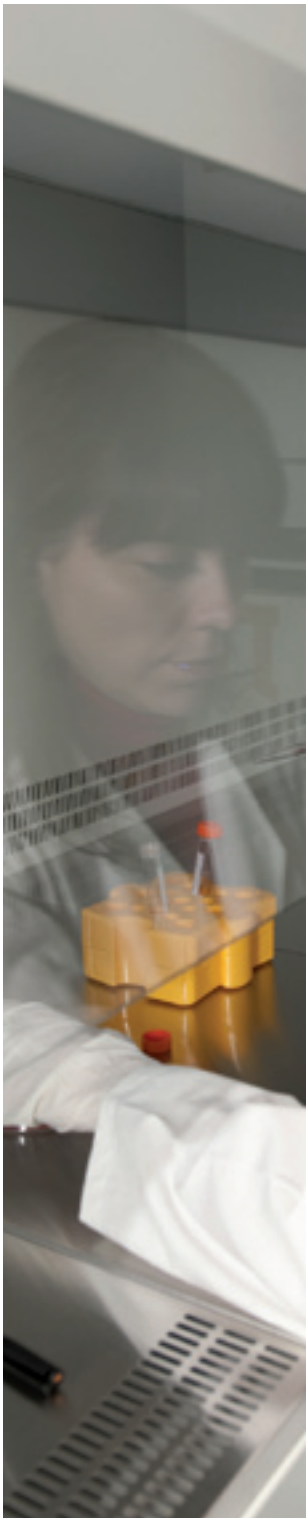
48. Electron-donating behavior of few-layer graphene in covalent ensembles with electron-accepting phthalocyanines. Ragoussi, M.-E., Katsukis, G., Roth, A., Malig, J., de la Torre, G., Guldi, D. M. & Torres, T. *J. Am. Chem. Soc.* (2014). 136 (12), 4593--8. (Doi: 10.1021/ja411830x.)

49. Electrochemical study of platinum deposited by electron beam evaporation for application as fuel cell electrodes. Raso, M., Carrillo, I., Mora, E., Navarro, E., García, M. & Leo, T. *Int. J. Hydrogen Energ.* (2014). **39** (10), 5301--5308. (Doi: 10.1016/j.ijhydene.2013.12.111.)

50. Study of Co-phthalocyanine films by surface plasmon resonance spectroscopy. Serrano, A., Monton, C., Valmianski, I., Gálvez, F., Cortajarena, A. L., de la Venta, J., Schuller, I. K. & García, M. A. *J. Appl. Phys. (*2014). **115** (10), 103106. (Doi: 10.1063/1.4868160.)

51. Attosecond Transient Absorption Spectroscopy of doubly-excited states in helium. Argenti, L.Ott, C., Pfeifer, T. & Martín, F. *Journal of Physics: Conference Series* (2014). **488** (3), 032030. (Doi: 10.1088/1742-6596/488/3/032030.)

52. The role of intramolecular scattering in K-shell photoionization. Ayuso, D., Ueda, K., Miron, C., Plésiat, E., Argenti, L., Patanen, M., Kooser, K., Mondal, S., Kimura, M., Sakai, K., Travnikova, O., Palacios, A., Decleva, P., Kukk, E. & Martín, F. *Journal of Physics: Conference Series* (2014). **488** (2), 022023. (Doi: 10.1088/1742-6596/488/2/022023.)



53. **Evidence of Oxygen Ferromagnetism in ZnO Based Materials.** Guglieri, C., Céspedes, E., Espinosa, A., Laguna-Marco, M. Á., Carmona, N., Takeda, Y., Okane, T., Nakamura, T., García-Hernández, M., García, M. Á. & Chaboy, J. *Adv. Functi. Mat.* (2014). 24 (14), 2094--2100. (Doi: 10.1002/adfm.201303087.)

54. **Lotus bioinspired superhydrophobic, self-cleaning surfaces from hierarchically assembled templates.** Ho, A. Y. Y., Luong Van, E., Lim, C. T., Natarajan, S., Elmouelhi, N., Low, H. Y., Vyakarnam, M., Cooper, K. & Rodríguez, I. *J. Polym. Sci. B: Pol. Phys.* (2014). **52** (8), 603--609. (Doi: 10.1002/polb.23461.)

55. **Continuum-continuum transitions between resonant states using the RABITT technique.** Jiménez, A., Argenti, L. & Martín, F. *Journal of Physics: Conference Series* (2014). **488** (2), 022014. (Doi: 10.1088/1742-6596/488/2/022014.)

56. **Effects of molecular potential and geometry on atomic core-level photoemission over an extended energy range - the case study of CO molecule.** Kukk, E., Ayuso, D., Thomas, T. D., Decleva, P., Patanen, M., Argenti, L., Plésiat, E., Palacios, A., Kooser, K., Travnikova, O., Mondal, S., Kimura, M., Sakai, K., Miron, C., Martín, F. & Ueda, K. *Journal of Physics: Conference Series* (2014). **488** (2), 022040. (Doi: 10.1088/1742-6596/488/2/022040.)

57. **Ultrafast nonadiabatic fragmentation dynamics of biomolecules.** López-Tarifa, P., Grzegorz, D., Rossich, E., du Penhoat, M.-A. H., Vuilleumier, R., Gaigeot, M.-P., Tavernelli, I., Politis, M.-F., Wang, Y., Díaz-Tendero, S., Martín, F. & Alcamí, M. *Journal of Physics: Conference Series* (2014). **488** (1), 012037. (Doi: 10.1088/1742-6596/488/1/012037.)

58. **Correlated electron and nuclear dynamics in strong field photoionization of H + 2.** Martín, F., Silva, R. E. F., Rivière, P., Catoire, F. & Bachau, H. *Journal of Physics: Conference Series* (2014). **488** (3), 032017. (Doi: 10.1088/1742-6596/488/3/032017.)

59. **Surface diffusion of Pb atoms on the Si(553)-Au surface in narrow quasi-one-dimensional channels.** Nita, P., Palotás, K., Jałochowski, M. & Krawiec, M. *Phys. Rev. B* (2014). **89** (16), 165426. (Doi: 10.1103/PhysRevB.89.165426.)

60. **Wave packet dynamics in molecular excited electronic states.** Palacios, A., González-Castrillo, A., Bachau, H. & Martín, F. *Journal of Physics: Conference Series* (2014). **488** (1), 012017. (Doi: 10.1088/1742-6596/488/1/012017.)

61. **Fragmentation dynamics of excited ionized polycyclic aromatic hydrocarbons.** Paris, C., Silva, H., Díaz-Tendero, S., Rapacioli, M., Spiegelman, F., Martín, F. & Alcamí, M. *Journal of Physics: Conference Series* (2014). **488** (10), 102027. (Doi: 10.1088/1742-6596/488/10/102027.)

62. **Fragmentation of amino acids induced by collisions with low-energy highly charged ions.** Piekarski, D. G., Maclot, S., Domaracka, A., Adoui, L., Alcamí, M., Rousseau, P., Díaz-Tendero, S., Huber, B. A. & Martín, F. *Journal of Physics: Conference Series* (2014). **488** (10), 102019. (Doi: 10.1088/1742-6596/488/10/102019.)

63. **Sterically hindered phthalocyanines for dye-sensitized solar cells: influence of the distance between the aromatic core and the anchoring group.** Ragoussi, M.-E., Yum, J.-H., Chandiran, A. K., Ince, M., de la Torre, G., Grätzel, M., Nazeeruddin, M. K. & Torres, T. *ChemPhysChem* (2014). **15** (6), 1033--6. (Doi: 10.1002/cphc.201301118.)

64. **Influence of the description of the initial bound wavefunction in the single ionization reaction of H_2O molecules.** Tachino, C. A., Monti, J. M., Fojón, O. A., Champion, C., Martín, F. & Rivarola, R. D. *Journal of Physics: Conference Series* (2014). **488** (10), 102028. (Doi: 10.1088/1742-6596/488/10/102028.)

65. **Bond formation in C^{+}_{59} – C_{60} collisions.** Zettergren, H., Rousseau, P., Wang, Y., Seitz, F., Chen, T., Gatchell, M., Alexander, J. D., Stockett, M. H., Rangama, J., Chesnel, J. Y., Capron, M., Poully, J. C., Domaracka, A., Méry, A., Maclot, S., Vizcaino, V., Schmidt, H. T., Adoui, L., Alcamí, M., Tielens, A. G. G. M., Martín, F., Huber, B. A. & Cederquist, H. *Journal of Physics: Conference Series* (2014). **488** (1), 012028. (Doi: 10.1088/1742-6596/488/1/012028.)

66. **A collection of fullerenes for synthetic access toward oriented charge-transfer cascades intriplechannel photosystems.** Bolag, A., López-Andarias, J., Lascano, S., Soleimanpour, S., Atienza, C., Sakai, N., Martín, N. & Matile, S. *Angew. Chem. Int. Ed.* (2014). **53** (19), 4890--5. (Doi: 10.1002/anie.201402042.)

67. **Ruthenoarenes versus phenol derivatives as axial linkers for subporphyrazine dimers and trimers.** Caballero, E., Romero-Nieto, C., Strau, V., Rodríguez-Morgade, M. S., Guldi, D. M., Sessler, J. L. & Torres, T. *Chem. Eur. J.* (2014). **20** (21), 6518--25. (Doi: 10.1002/chem.201304622.)

68. **Efficient and safe internalization of magnetic iron oxide nanoparticles: two fundamental requirements for biomedical applications.** Calero, M., Gutiérrez, L., Salas, G., Luengo, Y., Lázaro, A., Acedo, P., Morales, M. P., Miranda, R. & Villanueva, A. *Nanomedicine: nanotechnology, biology, and medicine* (2014). **10** (4), 733--43. (Doi: 10.1016/j.nano.2013.11.010.)

69. **T cells kill bacteria captured by transinfection from dendritic cells and confer protection in mice.** Cruz-Adalia, A., Ramirez-Santiago, G., Calabia-Linares, C., Torres-Torresano, M., Feo, L., Galán-Dez, M., Fernández-Ruíz, E., Pereiro, E., Guttmann, P., Chiappi, M., Schneider, G., Carrascosa, J. L., Chichón, F. J., Martínez Del Hoyo, G., Sánchez-Madrid, F. & Veiga, E. *Cell host & microbe* (2014). **15** (5), 611--22. (Doi: 10.1016/j.chom.2014.04.006.)

70. **Linking Pd(II) and Ru(II) phthalocyanines to single-walled carbon nanotubes.** D'Ambrosio, P., Carchesio, M., D'Alessandro, N., de la Torre, G. & Torres, T. *Dalton Trans.* (2014). **43** (20), 7473--9. (Doi: 10.1039/c3dt53277a.)

71. **Mechanically interlocked single-wall carbon nanotubes.** de Juan, A., Pouillon, Y., Ruíz-González, L., Torres-Pardo, A., Casado, S., Martín, N., Rubio, Á. & Pérez, E. M. *Angew. Chem. Int. Ed.* (2014). **53** (21), 5394--400. (Doi: 10.1002/anie.201402258.)

72. **Glutathione immunosensing platform based on total internal reflection ellipsometry enhanced by functionalized gold nanoparticles.** García-Marín, A., Abad, J. M., Ruíz, E., Lorenzo, E., Piqueras, J. & Pau, J. L. *Anal. Chem.* (2014). **86** (10), 4969--76. (Doi: 10.1021/ac5005212.)

73. **Non-statistical fragmentation of PAHs and fullerenes in collisions with atoms.** Gatchell, M. and Stockett, M.H. and Rousseau, P. and Chen, T. and Kulyk, K. and Schmidt, H.T. and Chesnel, J.Y. and Domaracka, A. and Méry, A. and Maclot, S. and Adoui, L. and Støchkel, K. and Hvelplund, P. and Wang, Y. and Alcamí, M. and Huber, B.A. and Martín, F. and Zettergren, H. and Cederquist, H. *Int. J. Mass Spectrom.* (2014). 365-**366**, 260--265. (Doi: 10.1016/j.ijms.2013.12.013.)

74. **High degree of polymerization in a fullerene-containing supramolecular polymer.** Isla, H., Pérez, E. M. & Martín, N. *Angew. Chem. Int. Ed.* (2014). **53** (22), 5629--33. (Doi: 10.1002/anie.201402828.)

75. **Vectorial Kerr magnetometer for simultaneous and quantitative measurements of the in-plane magnetization components.** Jiménez, E., Mikuszeit, N., Cuñado, J. L. F., Perna, P., Pedrosa, J., Maccariello, D., Rodrigo, C., Niño, M. A., Bollero, A., Camarero, J. & Miranda, R. *Rev. Sci. Instrum.* (2014). **85** (5), 053904. (Doi: 10.1063/1.4871098.)

76. Spatially Resolved, Site-Dependent Charge Transfer and Induced Magnetic Moment in TCNQ Adsorbed on Graphene. Maccariello, D., Garnica, M., Niño, M. A., Navo, C., Perna, P., Barja, S., Vázquez de Parga, A. L. & Miranda, R. *Chem. Mat.* (2014). **26** (9), 2883--2890. (Doi: 10.1021/cm5005467.)

77. Unraveling the Factors That Control Soft Landing of Small Silyl Ions on Fluorinated Self-Assembled Monolayers. Nogueira, J. J., Wang, Y., Martín, F., Alcamí, M., Glowacki, D. R., Shalashilin, D. V., Paci, E., Fernández-Ramos, A., Hase, W. L., Martínez-Núñez, E. & Vázquez, S. A. *J. Phys. Chem. C* (2014). **118** (19), 10159--10169. (Doi: 10.1021/jp501841a.)

78. Multiple ionization and hydrogen loss from neutral and positively-charged coronene. Paris, C., Alcamí, M., Martín, F. & Díaz-Tendero, S. *J. Chem. Phys.* (2014). **140** (20), 204307. (Doi: 10.1063/1.4875805.)

79. Direct experimental determination of the anisotropic magnetoresistive effects. Perna, P., Maccariello, D., Rodrigo, C., Cuñado, J. L. F., Muñoz, M., Prieto, J. L., Niño, M. A., Bollero, A., Camarero, J. & Miranda, R. *Appl. Phys. Lett.* (2014) 104 (20), 202407. (Doi: 10.1063/1.4878555.)

80. Electronic Structure of Fullerene Heterodimer in Bulk-Heterojunction Blends. Poluektov, O. G., Niklas, J., Mardis, K. L., Beaupré, S., Leclerc, M., Villegas, C., Erten-Ela, S., Delgado, J. L., Martín, N., Sperlich, A. & Dyakonov, V. *Adv. Energy Mat.* (2014). 4 (7), 130151-130158 (Doi: 10.1002/aenm.201301517.)

81. Engineering iron oxide nanoparticles for clinical settings Aitziber L. Cortajarena, Daniel Ortega, Sandra M. Ocampo, Alberto Gonzalez-García, Pierre Couleaud, Cristobal Belda-Iniesta and Angel Ayuso-Sacido *Nanobiomedicine*. 2014 **1**:2. doi: 10.5772/58841

82. H-shaped oligofluorenes for highly air-stable and low-threshold non-doped deep blue lasing. Qian, Y., Wei, Q., Del Pozo, G., Mróz, M. M., Lüer, L., Casado, S., Cabanillas-González, J., Zhang, Q., Xie, L., Xia, R. & Huang, W. *Adv. Mat.* (2014). 26 (18), 2937--42. (Doi: 10.1002/adma.201305355.)

83. New insights into rotavirus entry machinery: stabilization of rotavirus spike conformation is independent of trypsin cleavage. Rodríguez, J. M., Chichón, F. J., Martín-Forero, E., González-Camacho, F., Carrascosa, J. L., Castón, J. R. & Luque, D. *PLoS pathogens* (2014). **10** (5), e1004157. (Doi: 10.1371/journal.ppat.1004157.)

84. Effective high-energy ball milling in air of Fe65Co35 alloys. Sirvent, P., Berganza, E., Aragón, A. M., Bollero, A., Moure, A., García-Hernández, M., Marín, P., Fernández, J. F. & Quesada, A. *J. Appl. Phys.* (2014). **115** (17), 17B505. (Doi: 10.1063/1.4862220.)

85. Neoglycoenzymes. Villalonga, M. L., Dez, P., Sánchez, A., Gamella, M., Pingarrón, J. M. & Villalonga, R. *Chem. Rev.* (2014). **114** (9), 4868--917. (Doi: 10.1021/cr400290x.)

86. Modeling the interplay between protein and lipid aggregation in supported membranes. de Prado Salas, P. G., Encinar, M., Alonso, A., Vélez, M. & Tarazona, P. *Chem. Phys. Lipids* (2014). **185**, 141--152. (Doi: 10.1016/j.chemphyslip.2014.06.006.)

87. Toward the design of smart delivery systems controlled by integrated enzyme-based biocomputing ensembles. Díez, P., Sánchez, A., Gamella, M., Martínez-Ruíz, P., Aznar, E., de la Torre, C., Murgua, J. R., Martínez-Máñez, R., Villalonga, R. & Pingarrón, J. M. *J. Am. Chem. Soc.* (2014). **136** (25), 9116--23. (Doi: 10.1021/ja503578b.)

88. **Donor-Acceptor Hybrids for Organic Electronics.** Espíldora, E., Delgado, J. L. & Martín, N. *Isr. J. Chem.* (2014). 54 (5-6), 429--439. (Doi: 10.1002/ijch.201400007.)

89. **Vortex pinning vs superconducting wire network: origin of periodic oscillations induced by applied magnetic fields in superconducting films with arrays of nanomagnets.** Gómez, A., del Valle, J., González, E. M., Chiliotte, C. E., Carreira, S. J., Bekeris, V., Prieto, J. L., Schuller, I. K. & Vicent, J. L. *Supercond. Sci. Tech.* (2014). **27** (6), 065017. (Doi: 10.1088/0953-2048/27/6/065017.)

90. **High Therapeutic Efficiency of Magnetic Hyperthermia in Xenograft Models Achieved with Moderate Temperature Dosages in the Tumor Area.** Kossatz, S., Ludwig, R., Dähring, H., Ettelt, V., Rimkus, G., Marciello, M., Salas, G., Patel, V., Terán, F. J. & Hilger, I. *Pharm. Res.* (2014). **31**, (12), 3274--3288. (Doi: 10.1007/s11095-014-1417-0.)

91. **Structural disorder versus spin canting in monodisperse maghemite nanocrystals.** Kubickova, S., Niznansky, D., Morales Herrero, M. P., Salas, G. & Vejpravova, J. *Appl. Phys. Lett.* (2014). 104 (22), 223105. (Doi: 10.1063/1.4881331.)

92. **Does a cyclopropane ring enhance the electronic communication in dumbbell-type C_{60} Dimers?** La Rosa, A., Gillemot, K., Leary, E., Evangeli, C., González, M. T., Filippone, S., Rubio-Bollinger, G., Agraït, N., Lambert, C. J. & Martín, N. *J. Org. Chem.* (2014). 79 (11), 4871--7. (Doi: 10.1021/jo500342x.)

93. **Special issue on ultrafast electron and molecular dynamics.** Martín, F., Hishikawa, A. & Vrakking, M. *J. Phys. B: At. Mol. Opt.Phys.* (2014). 47 (12), 120201. (Doi: 10.1088/0953-4075/47/12/120201.)

94. **Electrochemically generated nanoparticles of halogen-bridged mixed-valence binuclear metal complex chains.** Martínez-Periñán, E., Azani, M.-R., Abad, J. M., Mateo-Martí, E., Pariente, F., Mas-Ballesté, R., Zamora, F. & Lorenzo, E. *Chem. Eur. J.* (2014). **20** (23), 7107--15. (Doi: 10.1002/chem.201400029.)

95. **Electron streaking and dissociation in laser-assisted photoionization of molecular hydrogen.** Palacios, A., González-Castrillo, A. & Martín, F. *J. Phys. B: At. Mol. Opt.Phys.* (2014). **47** (12), 124013. (Doi: 10.1088/0953-4075/47/12/124013.)

96. **Cl-capped CdSe nanocrystals via in situ generation of chloride anions.** Palencia, C., Lauwaet, K., de la Cueva, L., Acebrón, M., Conde, J. J., Meyns, M., Klinke, C., Gallego, J. M., Otero, R. & Juárez, B. H. *Nanoscale* (2014). **6** (12), 6812--8. (Doi: 10.1039/c4nr00431k.)

97. **Vibrationally resolved C 1s photoionization cross section of CF 4.** Patanen, M., Kooser, K., Argenti, L., Ayuso, D., Kimura, M., Mondal, S., Plésiat, E., Palacios, A., Sakai, K., Travnikova, O., Decleva, P., Kukk, E., Miron, C., Ueda, K. & Martín, F. *J. Phys. B: At. Mol. Opt.Phys.* (2014). **47** (12), 124032. (Doi: 10.1088/0953-4075/47/12/124032.)

98. **Cellular accumulation, lipophilicity and photocytotoxicity of diazido platinum(IV) anticancer complexes.** Pizarro, A. M., McQuitty, R. J., Mackay, F. S., Zhao, Y., Woods, J. A. & Sadler, P. J. *ChemMedChem* (2014). **9** (6), 1169--75. (Doi: 10.1002/cmdc.201402066.)

99. **Modern Synthetic Tools toward the Preparation of Sophisticated Phthalocyanine-Based Photoactive Systems.** Ragoussi, M.-E. & Torres, T. *Chem. Asian J.* (2014). **9** (10), 2676--2707. (Doi: 10.1002/asia.201402311.)

100. **Modified SWCNTs with amphoteric redox and solubilizing properties.** Rodríguez-Pérez, L., García, R., Herranz, M. Á. & Martín, N. *Chem. Eur. J.* (2014). **20** (24), 7278--86. (Doi: 10.1002/chem.201400183.)

101. **Electron-accepting phthalocyanine–pyrene conjugates: towards liquid phase exfoliation of graphite and photoactive nanohybrid formation with graphene.** Roth, A., Ragoussi, M.-E., Wibmer, L., Katsukis, G., de la Torre, G., Torres, T. & Guldi, D. M. *Chem. Sci.* (2014). **5** (9), 3432. (Doi: 10.1039/C4SC00709C.)

102. **Imprinted labyrinths and percolation in Nd-Co/Nb magnetic/superconducting hybrids.** Ruíz-Valdepeñas, L., Velez, M., Valdés-Bango, F., Alvarez-Prado, L. M., Garcia-Alonso, F. J., Martín, J. I., Navarro, E., Alameda, J. M. & Vicent, J. L. *J. Appl. Phys.* (2014). **115** (21), 213901. (Doi: 10.1063/1.4881277.)

103. **Five-Vertex Lanthanide Coordination on Surfaces: A Route to Sophisticated Nanoarchitectures and Tessellations.** Urgel, J. I., Ecija, D., Auwärter, W., Papageorgiou, A. C., Seitsonen, A. P., Vijayaraghavan, S., Joshi, S., Fischer, S., Reichert, J. & Barth, J. V. *J. Phys. Chem. C* (2014). **118** (24), 12908--12915. (Doi: 10.1021/jp502901z.)

104. **Orthogonal Resonator Modes and Low Lasing Threshold in Highly Emissive Distyrylbenzene-Based Molecular Crystals.** Varghese, S., Yoon, S.-J., Casado, S., Fischer, R. C., Wannemacher, R., Park, S. Y. & Gierschner, J. *Adv. Opt. Mat.* (2014). **2** (6), 542--548. (Doi: 10.1002/adom.201300512.)

105. **Decreased Recombination Through the Use of a Non-Fullerene Acceptor in a 6.4% Efficient Organic Planar Heterojunction Solar Cell.** Verreet, B., Cnops, K., Cheyns, D., Heremans, P., Stesmans, A., Zango, G., Claessens, C. G., Torres, T. & Rand, B. P. *Adv. Energy Mat.* (2014). 4 (8), n/a--n/a. (Doi: 10.1002/aenm.201301413.)

106. **Formation dynamics of fullerene dimers *C*+118, *C*+119, and *C*+120.** Wang, Y., Zettergren, H., Rousseau, P., Chen, T., Gatchell, M., Stockett, M. H., Domaracka, A., Adoui, L., Huber, B. A., Cederquist, H., Alcamí, M. & Martín, F. *Phys. Rev. A* (2014). **89** (6), 062708. (Doi: 10.1103/PhysRevA.89.062708.)

107. **Chain-length and temperature dependence of self-assembled monolayers of alkylthiolates on Au (111) and Ag (111) surfaces.** Wang, Y., Solano Canchaya, J. G., Dong, W., Alcamí, M., Busnengo, H. F. & Martín, F. *J. Phys. Chem. A* (2014). **118** (23), 4138--46. (Doi: 10.1021/jp412285v.)

108. **Magnetoplasmonic Nanorings as Novel Architectures with Tunable Magneto-optical Activity in Wide Wavelength Ranges.** Feng, H. Y., Luo, F., Kekesi, R., Granados, D., Meneses-Rodríguez, D., García, J. M., García-Martín, A., Armelles, G. & Cebollada, A. *Adv. Opt. Mat.* (2014). **2** (7), 612--617. (Doi: 10.1002/adom.201400125.)

109. **Discovery of Selective Ligands for Telomeric RNA G-quadruplexes (TERRA) through (19) F-NMR Based Fragment Screening.** Garavs, M., López-Méndez, B., Somoza, A., Oyarzabal, J., Dalvit, C., Villasante, A., Campos-Olivas, R. & González, C. *ACS Chemical Biology* (2014). **9** (7), 1559--66. (Doi: 10.1021/cb500100z.) 93

110. **Reconstitution of respiratory complex I on a biomimetic membrane supported on gold electrodes.** Gutiérrez-Sanz, O., Olea, D., Pita, M., Batista, A. P., Alonso, A., Pereira, M. M., Vélez, M. & De Lacey, A. L. *Langmuir* (2014). **30** (29), 9007--15. (Doi: 10.1021/la501825r.)

111. **Molecular Engineering of Phthalocyanine Sensitizers for Dye-Sensitized Solar Cells.** Ince, M., Yum, J.-H., Kim, Y., Mathew, S., Grätzel, M., Torres, T. & Nazeeruddin, M. K. *J. Phys. Chem. C* (2014). **118** (30). *J. Phys. Chem. C*, 17166--17170. (Doi: 10.1021/jp502447y.)

112. **Ferromagnetic nanoparticles in Sn-O system.** Kuznetcov, M. V., Belousova, O. V., Ortega, D. & Morozov, I. G. *Inorg. Materials* (2014). **50** (8), 793--802. (Doi: 10.1134/S0020168514080111.)

113. Multifunctionalization of magnetic nanoparticles for controlled drug release: a general approach. Latorre, A., Couleaud, P., Aires, A., Cortajarena, A. L. & Somoza, Á. *Eur. J. Med. Chem.* (2014). 82, 355--62. (Doi: 10.1016/j.ejmech.2014.05.078.)

114. DNA and aptamer stabilized gold nanoparticles for targeted delivery of anticancer therapeutics. Latorre, A., Posch, C., Garcíamartín, Y., Celli, A., Sanlorenzo, M., Vujic, I., Ma, J., Zekhtser, M., Rappersberger, K., Ortiz-Urda, S. & Somoza, Á. *Nanoscale* (2014). **6** (13), 7436--42. (Doi: 10.1039/c4nr00019f.)

115. Hybrid Gaussian–B-spline basis for the electronic continuum: Photoionization of atomic hydrogen. Marante, C., Argenti, L. & Martín, F. *Phys. Rev. A (*2014). 90 (1), 012506 (Doi: 10.1103/PhysRevA.90.012506.)

116. Self-assembly triggered by self-assembly: optically active, paramagnetic micelles encapsulated in protein cage nanoparticles. Millán, J. G., Brasch, M., Anaya-Plaza, E., de la Escosura, A., Velders, A. H., Reinhoudt, D. N., Torres, T., Koay, M. S. T. & Cornelissen, J. J. L. M. *J. Inorg. Biochem.* (2014). 136, 140--6. (Doi: 10.1016/j.jinorgbio.2014.01.004.)

117. The competition for graphene formation on Re (0001): A complex interplay between carbon segregation, dissolution and carburization. Miniussi, E., Pozzo, M., Mente , T., Niño, M.A, Locatelli, A., Vesselli, E., Comelli, G., Lizzit, S., Alfè, D. & Baraldi, A. *Carbon* (2014). **73**, 389--402. (Doi: 10.1016/j.carbon.2014.02.081.)

118. Molecular resolution friction microscopy of Cu phthalocyanine thin films on dolomite (104) in water. Nita, P., Pimentel, C., Luo, F., Milián-Medina, B., Gierschner, J., Pina, C. M. & Gnecco, E. *Nanoscale* (2014). **6** (14), 8334--9. (Doi: 10.1039/c4nr01522c.)

119. Synthesis, photophysical studies and $^1O_2$ generation of carboxylate-terminated zinc phthalocyanine dendrimers. Setaro, F., Ruíz-González, R., Nonell, S., Hahn, U. & Torres, T**.** *J. Inorg. Biochem.* (2014) 136, 170--6. (Doi: 10.1016/j.jinorgbio.2014.02.007.)

120. On the role of aggregation effects in the performance of perylene-diimide based solar cells. Singh, R., Giussani, E., Mróz, M. M., Di Fonzo, F., Fazzi, D., Cabanillas-González, J., Oldridge, L., Vaenas, N., Kontos, A. G., Falaras, P., Grimsdale, A. C., Jacob, J., Müllen, K. & Keivanidis, P. E. *Org. Electron.* (2014). 15 (7), 1347--1361. (Doi: 10.1016/j.orgel.2014.03.044.)

121. Fabrication of Low-Cost Paper-Based Microfluidic Devices by Embossing or Cut-and-Stack Methods. Thuo, M. M., Martínez, R. V., Lan, W.-J., Liu, X., Barber, J., Atkinson, M. B. J., Bandarage, D., Bloch, J.-F. & Whitesides, G. M. *Chem. Mat.* (2014). 26 (14), 4230--4237. (Doi: 10.1021/cm501596s.)

122. Surface-assisted dehydrogenative homocoupling of porphine molecules. Wiengarten, A., Seufert, K., Auwärter, W., Ecija, D., Diller, K., Allegretti, F., Bischoff, F., Fischer, S., Duncan, D. A., Papageorgiou, A. C., Klappenberger, F., Acres, R. G., Ngo, T. H. & Barth, J. V. *J. Am. Chem. Soc.* (2014). **136** (26), 9346--54. (Doi: 10.1021/ja501680n.)

123. ⩾Phenyl quenching of 9-phenylphenalenones: a novel photocyclisation reaction with biological implications. Bucher, G., Bresol-Obach, R., Brosa, C., Flors, C., Luis, J. G., Grillo, T. A. & Nonell, S. *PhysChemChemPhys (*2014). **16** (35), 18813--20. (Doi: 10.1039/c4cp02783c.)

124. Organic dyes containing 2-(1,1-dicyanomethylene)rhodanine as an efficient electron acceptor and anchoring unit for dye-sensitized solar cells. Echeverry, C. A., Insuasty, A., Herranz, M. Á., Ortíz, A., Cotta, R., Dhas, V., Echegoyen, L., Insuasty, B. & Martín, N. *Dyes and Pigments* (2014). **107**, 9--14. (Doi: 10.1016/j.dyepig.2014.03.010.)

125. **Probing the site-dependent kondo response of nanostructured graphene with organic molecules.** Garnica, M., Stradi, D., Calleja, F., Barja, S., Díaz, C., Alcamí, M., Arnau, A., Vázquez de Parga, A. L., Martín, F. & Miranda, R. *Nano lett.* (2014). **14** (8), 4560--7. (Doi: 10.1021/nl501584v.)

126. **Biomimetic oxidation of pyrene and related aromatic hydrocarbons. Unexpected electron accepting abilities of pyrenequinones.** López-Moreno, A., Clemente-Tejeda, D., Calbo, J., Naeimi, A., Bermejo, F. A., Ortí, E. & Pérez, E. M. *Chem. Commun.* (2014). **50** (66), 9372--5. (Doi: 10.1039/c4cc04026k.)

127. **Growth, reaction and nanowire formation of Fe on the ZnS (1 0 0) surface.** Man, K. L., Pavlovska, A., Bauer, E., Locatelli, A., Mente , T. O., Niño, M. A., Wong, G. K. L., Sou, I. K. & Altman, M. S. *J. Phys.: Condens. Matter* (2014). **26** (31), 315006. (Doi: 10.1088/0953-8984/26/27/315006.)

128. **Chiral fullerenes from asymmetric catalysis.** Maroto, E. E., Izquierdo, M., Reboredo, S., Marco-Martínez, J., Filippone, S. & Martín, N. *Accounts Chem. Res.* (2014). **47** (8), 2660--70. (Doi: 10.1021/ar500201b.)

129. **Ferromagnetic SnO nanoparticles** M. V. Kuznetsov, O. V. Belousova, D. Ortega, Y. G. Morozov *Inorg. Mater.* **50** (2014) 793-802 (Doi: 10.1134/S0020168514080111.)

130. **Single-layer MoS2 roughness and sliding friction quenching by interaction with atomically flat substrates.** Quereda, J., Castellanos-Gómez, A., Agraït, N. & Rubio-Bollinger, G. *Appl. Phys. Lett.* (2014). 105 (5), 053111. (Doi: 10.1063/1.4892650.)

131. **Modulation of Magnetic Heating via Dipolar Magnetic Interactions in Monodisperse and Crystalline Iron Oxide Nanoparticles.** Salas, G., Camarero, J., Cabrera, D., Takacs, H., Varela, M., Ludwig, R., Dähring, H., Hilger, I., Miranda, R., Morales, M. d. P. & Terán, F. J. *J. Phys. Chem. C* (2014). **118** (34), 19985--19994. (Doi: 10.1021/jp5041234.)

132. **Effect of a chiral ligand in the self-assembly of subphthalocyanine-based metallosupramolecular capsules.** Sánchez-Molina, I., Lucena-Alcalde, G., Claessens, C. G. & Torres, T. *Can. J. Chem.* (2014). **92** (8), 685--687. (Doi: 10.1139/cjc-2014-0053.)

133. **Water-Soluble Reduced Graphene Oxide-Carboxymethylcellulose Hybrid Nanomaterial for Electrochemical Biosensor Design.** Araque, E., Villalonga, R., Gamella, M., Martínez-Ruíz, P., Sánchez, A., García-Baonza, V. & Pingarrón, J. M. *ChemPlusChem* (2014). **79** (9), 1334--1341. (Doi: 10.1002/cplu.201402017.)

134. **Single-molecule portrait of DNA and RNA double helices.** Arias-González, J. R. *Integr. Biol.* (2014). **6** (10), 904--25. (Doi: 10.1039/c4ib00163j.)

135. **Direct measurement of the dielectric polarization properties of DNA.** Cuervo, A., Dans, P. D., Carrascosa, J. L., Orozco, M., Gomila, G. & Fumagalli, L. *Proc. Natl. Acad. Sci. USA* (2014). **111** (35), E3624--30. (Doi: 10.1073/pnas.1405702111.)

136. **Formation of multigradient porous surfaces for selective bacterial entrapment.** de León, A. S., del Campo, A., Cortajarena, A. L., Fernández-García, M., Muñoz-Bonilla, A. & Rodrguez-Hernández, J. *Biomacromolecules* (2014). **15** (9), 3338--48. (Doi: 10.1021/bm500824d.)

137. **Rhodanine-3-acetic acid and ϖ-extended tetrathiafulvalene (exTTF) based systems for dye-sensitized solar cells.** Echeverry, C. A., Herranz, M. Á., Ortiz, A., Insuasty, B. & Martín, N. *New J. Chem.* (2014). **38** (12), 5801--5807. (Doi: 10.1039/C4NJ01261E.)

138. An STM study of molecular exchange processes in organic thin film growth. Gallego, J. M., Ecija, D., Martín, N., Otero, R. & Miranda, R. *Chem. Commun.* (2014). 50 (69), 9954--7. (Doi: 10.1039/c4cc03656e.)

139. Structural versus Electrical Functionalization of Oligo(phenylene ethynylene) Diamine Molecular Junctions. González, M. T., Zhao, X., Manrique, D. Z., Miguel, D., Leary, E., Gulcur, M., Batsanov, A. S., Rubio-Bollinger, G., Lambert, C. J., Bryce, M. R. & Agrat, N. *J. Phys. Chem. C* (2014). **118** (37), 21655--21662. (Doi: 10.1021/jp506078a.)

140. An Insight into the Mechanism of the Axial Ligand Exchange Reaction in Boron Subphthalocyanine Macrocycles. Guilleme, J., Martínez-Fernández, L., González-Rodríguez, D., Corral, I., Yáñez, M. & Torres, T. *J. Am. Chem. Soc.* (2014). **136** (40), 14289--14298. (Doi: 10.1021/ja508181b.)

141. Ultrasound-induced transformation of fluorescent organic nanoparticles from a molecular rotor into rhomboidal nanocrystals with enhanced emission. Koenig, M., Torres, T., Barone, V., Brancato, G., Guldi, D. M. & Bottari, G *Chem. Commun.* (2014). 50 (85), 12955--8. (Doi: 10.1039/c4cc05531d.)

142. Efficient synthesis of ABAB functionalized phthalocyanines. Fazio, E., Jaramillo-Garcia, J., de la Torre, G., & Torres, T. *Organic Letters,* (2014). *16*(18), 4706-4709. (Doi:10.1021/ol502042r)

143. Design principles of chemiluminescence (CL) chemodosimeter for self-signaling detection: luminol protective approach. Kwon, M. S., Jang, G., Bilby, D., Milián-Medina, B., Gierschner, J., Lee, T. S. & Kim, J. *RSC Adv.* (2014). 4 (87), 46488--46493. (Doi: 10.1039/C4RA08182J.)

144. Controlled nanometric fibers of self-assembled designed protein scaffolds. Mejías, S. H., Sot, B., Guantes, R. & Cortajarena, A. L. *Nanoscale* (2014). **6** (19), 10982--8. (Doi: 10.1039/c4nr01210k.)

145. Atomic mechanisms and diffusion anisotropy of Cu tetramers on Cu (111). Ferrón, J. Miranda, R. and de Miguel J. J. *Phys. Rev. B* **90**, 125437 (2014) (Doi: 10.1103/Phys-RevB.90. 125437.)

146. Reversible vapochromic response of polymer films doped with a highly emissive molecular rotor. Minei, P., Koenig, M., Battisti, A., Ahmad, M., Barone, V., Torres, T., Guldi, D. M., Brancato, G., Bottari, G. & Pucci, A. *J. Mater. Chem. C* (2014). **2** (43), 9224--9232. (Doi: 10.1039/C4TC01737D.)

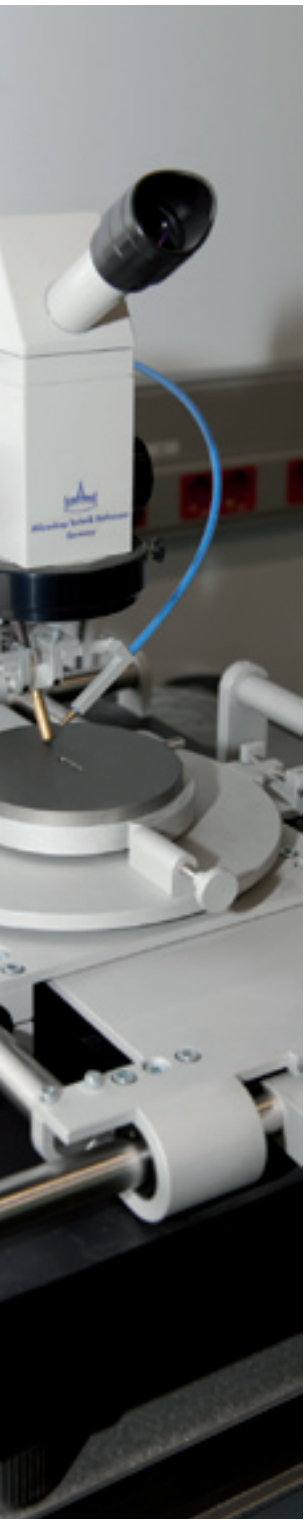
147. NMR spectroscopy reveals a preferred conformation with a defined hydrophobic cluster for polyglutamine binding peptide 1. Ramos-Martín, F., Hervás, R., Carrión-Vázquez, M. & Laurents, D. V. *Arch. Biochem. Biophys* (2014). **558**, 104--10. (Doi: 10.1016/j.abb.2014.06.025.)

148. Adsorption of tetrathiafulvalene (TTF) on Cu (1 0 0): can ϖ-stacked 1-D aggregates be formed at low temperature? Sarasola, A., Barja, S., Vázquez de Parga, A. L. & Arnau, A. *Chem. Phys. Lett.* (2014). **612**, 45--50. (Doi: 10.1016/j.cplett.2014.07.067.)

149. Nanoelectrical analysis of single molecules and atomic-scale materials at the solid/liquid interface. Nirmalraj, P., Thompson, D., Molina-Ontoria, A., Sousa, M., Martin, N., Gotsmann, B., & Riel, H. *Nature Materials (*2014). *13*(10), 947-953. (Doi:10.1038/NMAT4060)

150. Ultrafast electron dynamics in phenylalanine initiated by attosecond pulses. Calegari, F., Ayuso, D., Trabattoni, A., Belshaw, L., De Camillis, S., Anumula, S., Frassetto, F., Poletto, L., Palacios, A., Decleva, P., Greenwood, J. B., Martín, F. & Nisoli, M. *Science* (2014). **346** (6207), 336--339. (Doi: 10.1126/science.1254061.)

151. Mechanics of freely-suspended ultrathin layered materials. Castellanos-Gómez, A., Singh, V., van der Zant, H. S. J. & Steele, G. A. *Ann. Phys.* (2014). **527** (1-2), 27--44. (Doi: 10.1002/andp.201400153.)



152. **Bacterially synthesized ferrite nanoparticles for magnetic hyperthermia applications.** Céspedes, E., Byrne, J. M., Farrow, N., Moise, S., Coker, V. S., Bencsik, M., Lloyd, J. R. & Telling, N. D. *Nanoscale* (2014). **6** (21), 12958--70. (Doi: 10.1039/c4nr03004d.)

153. **A distyrylbenzene based highly efficient deep red/near-infrared emitting organic solid.** Kim, M., Whang, D. R., Gierschner, J. & Park, S. Y *J. Mat. Chem. C* (2014). **3** (2), 231--234. (Doi: 10.1039/C4TC01763C.)

154. **High harmonic spectroscopy of electron localization in the hydrogen molecular ion.** Morales, F., Rivière, P., Richter, M., Gubaydullin, A., Ivanov, M., Smirnova, O. & Martín, F. *J. Phys. B: At. Mol. Opt.Phys* (2014). **47** (20), 204015. (Doi: 10.1088/0953-4075/47/20/204015.)

155. **Circular dichroism in molecular-frame photoelectron angular distributions in the dissociative photoionization of H2 and D2 molecules.** Pérez-Torres, J. F., Sanz-Vicario, J. L., Veyrinas, K., Billaud, P., Picard, Y. J., Elkharrat, C., Poullain, S. M., Saquet, N., Lebech, M., Houver, J. C., Martín, F. & Dowek, D. *Phys. Rev. A* (2014). **90** (4), 043417. (Doi: 10.1103/PhysRevA.90.043417.)

156. **Bonding in exohedral metal–fullerene cationic complexe.** Robledo, M., Aguirre, N. F., Díaz-Tendero, S., Martín, F. & Alcamí, M. *RSC Adv.* (2014). 4 (95), 53010--53020. (Doi: 10.1039/C4RA10776D.)

157. **Cyclopentadithiophene-functionalized Ru (II)-bipyridine sensitizers for dye-sensitized solar cells.** Urbani, M., Medel, M., Kumar, S. A., Chandiran, A. K., González-Rodríguez, D., Grätzel, M., Nazeeruddin, M. K. & Torres, T. *Polyhedron* (2014). **82**, 132--138. (Doi:10.1016/j.poly.2014.05.045.)

158. **Room temperature spin-polarizations of Mn-based antiferromagnetic nanoelectrodes.** Yamada, T. K. & Vazquez de Parga, A. L. *Appl. Phys. Lett.* (2014). **105** (18), 183109. (Doi: 10.1063/1.4901047.)

159. **Random telegraph signals in molecular junctions.** Brunner, J., González, M. T., Schönenberger, C. & Calame, M. *J. Phys.: Condens. Matter* (2014). 26 (47), 474202. (Doi: 10.1088/0953-8984/26/47/474202.)

160. **Enantiospecific spin polarization of electrons photoemitted through layers of homochiral organic molecules.** Niño, M. Á., Kowalik, I. A., Luque, F. J., Arvanitis, D., Miranda, R. & de Miguel, J. J. *Adv. Mat.* (2014). 26 (44), 7474--9. (Doi: 10.1002/adma.201402810.)

161. **Charge-transfer-induced isomerization of DCNQI on Cu(100).** Urban, C., Wang, Y., Rodriguez-Fernandez, J., Angeles Herranz, M., Alcami, M., Martin, N., Miranda, R. *J. Phys. Chem. C* (2014). *118*(47), 27388-27392. (Doi:10.1021/jp508458y)

162. **A comprehensive study of extended tetrathiafulvalene cruciform molecules for molecular electronics: synthesis and electrical transport measurements.** Parker, C. R., Leary, E., Frisenda, R., Wei, Z., Jennum, K. S., Glibstrup, E., Abrahamsen, P. B., Santella, M., Christensen, M. A., Della Pia, E. A., Li, T., González, M. T., Jiang, X., Morsing, T. J., Rubio-Bollinger, G., Laursen, B. W., Nrgaard, K., van der Zant, H., Agraït, N. & Nielsen, M. B. *J. Am. Chem. Soc.* (2014). **136** (47), 16497--507. (Doi: 10.1021/ja509937k.)

163. **Encapsulation of phthalocyanine-C60 fullerene conjugates into metallosupramolecular subphthalocyanine capsules: a turn of the screw.** Sánchez Molina, I., Ince, M., Bottari, G., Claessens, C. G., Martínez-Díaz, M. V. & Torres, T. *Turk. J. Chem.* (2014) **38**: 1006 – 1012. (Doi:10.3906/kim-1406-18)

164. **Miniature objective lens with variable focus for confocal endomicroscopy.** Kim, M., Kang, D., Wu, T., Tabatabaei, N., Carruth R.W., V Martinez, R., Whitesides, G.M., Nakajima Y., and Tearney, G. J. *Biomed Opt Express.* **5**(12): 4350–4361 (2014). (Doi: 10.1364/BOE.5.004350)

165. Spatial variation of a giant spin-orbit effect induces electron confinement in graphene on Pb islands. Calleja, F., Ochoa, H., Garnica, M., Barja, S., Navarro, J. J., Black, A., Otrokov, M. M., Chulkov, E. V., Arnau, A., Vázquez de Parga, A. L., Guinea, F. & Miranda, R. *Nature Physics* (2014). (Doi: 10.1038/nphys3173.)

166. Anisotropy effects and friction maps in the framework of the 2d PT model. Fajardo, O., Gnecco, E. & Mazo, *Physica B: Condens. Matter* (2014). **455**, 44--48. (Doi:10.1016/j.physb.2014.07.042.)

167. Large-scale nanoshaping of ultrasmooth 3D crystalline metallic structures. Gao, H., Hu, Y., Xuan, Y., Li, J., Yang, Y., Martinez, R.V., Li, C., Luo, J., Qi, M., and Cheng G.J. *Science*, 2014: 346, 1352-1356. (Doi: 10.1126/science.12601339)

168. Meso-substituted porphyrin with benzo[1,2-b:4,5-b ']dithiophene moieties. Urbani, M., & Torres, T. *Macroheterocycles,* (2014). *7*(2), 133-138. (Doi:10.6060/mhc140501t)

169. Mapping spin distributions in electron acceptor molecules adsorbed on nanostructured graphene by the Kondo effect. Garnica, M., Calleja, F., Vázquez de Parga, A. L. & Miranda, R. *Surf. Sci.* (2014). **630**, 356-- 360. (Doi: 10.1016/j.susc.2014.07.028.)

170. Channeling motion of gold nanospheres on a rippled glassed surface. Gnecco, E., Nita, P., Casado, S., Pimentel, C., Mougin, K., Giordano, M. C., Repetto, D. & de Mongeot, F. B. *Nanotechnology* (2014). **25** (48), 485302. (Doi: 10.1088/0957-4484/25/48/485302.)

171. Modulation of Attosecond Beating in Resonant Two-Photon Ionization. Jiménez-Galán, Á., Argenti, L. & Martín, F. *Phys. Rev. Lett.* (2014). 113 (26), 263001. (Doi: 10.1103/PhysRevLett.113.263001.)

172. Highly ordered n/p-co-assembled materials with remarkable charge mobilities. López-Andarias, J., Rodríguez, M. J., Atienza, C., López, J. L., Mikie, T., Casado, S., Seki, S., Carrascosa, J. L. & Martín, N. *J. Am. Chem. Soc.* (2014). **137** (2), 893--897. (Doi: 10.1021/ja510946c.)

173. Electroactive carbon nanoforms: a comparative study via sequential arylation and click chemistry reactions. Mateos-Gil, J., Rodríguez-Pérez, L., Moreno Oliva, M., Katsukis, G., Romero-Nieto, C., Herranz, M. Á., Guldi, D. M. & Martín, N. *Nanoscale* (2014). **7** (3), 1193--200. (Doi: 10.1039/c4nr04365k.)

174. Time reconstruction of harmonic emission in molecules near the ionization threshold. Rivière, P; Morales, F ; Richter, M ; Medisauskas, L ; Smirnova, O; Martín, F. 2014 J. Phys. B: At. Mol. Opt. Phys. **47** 241001. (Doi:10.1088/0953-4075/47/24/241001)

175. Controlling the spatial arrangement of organic magnetic anions adsorbed on epitaxial graphene on Ru (0001). Stradi, D., Garnica, M., Diaz, C., Calleja, F., Barja, S., Martín, N., Alcamí, M., Vázquez de Parga, A.L., Miranda, R., Martín, F. *Nanoscale* (2014). **6** (24), 615271-9 (DOI:10.1039/c4nr02917h)

176. Unprecedented Chemical Reactivity of a Paramagnetic Endohedral Metallofullerene La@Cs-C82 that Leads Hydrogen Addition in the 1,3-Dipolar Cycloaddition Reaction. Takano, Y., Slanina, Z., Mateos, J., Tsuchiya, T., Kurihara, H., Uhlik, F., Herranz, M. Á., Martín, N., Nagase, S. & Akasaka, T. *J.Am.Chm.Soc.* (2014). **136** (50), 17537--46. (Doi: 10.1021/ja509407j.)

177. Meso-Substituted Porphyrins for Dye-Sensitized Solar Cells. Urbani, M., Grätzel, M., Nazeeruddin, M. K. & Torres, T. *Chem. Rev.* (2014). **114** (24), 141212154229006. (Doi: 10.1021/cr5001964.)

178. **Tautomerism and atropisomerism in free-base (meso)-strapped porphyrins: static and dynamic aspects.** Urbani, M. & Torres, T. *Chem. Eur. J.* (2014). **20** (7), 2016--21. (Doi: 10.1002/chem.20130363 (2014). **20** (49), 16337--49. (Doi: 10.1002/chem.201403881.)

179. **Reconstruction and control of a time-dependent two-electron wave packet.** Ott, C., Kaldun, A., Argenti, L., Raith, P., Meyer, K., Laux, M., Zhang, Y., Blättermann, A., Hagstotz, S., Ding, T., Heck, R., Madroñero, J., Martín, F. & Pfeifer, T. *Nature* 2014 **516**, M374–378. (Doi:10.1038/nature14026)

3.1.2. Contributions to books

1. **XUV Lasers for Ultrafast Electronic Control in H2.** Palacios, A., Riviere, P., González-Castrillo, A. & Martín, F.de Nalda, R. & Ba ares, L. in *Ultrafast Phenomena in Molecular Sciences, Vol. 107. (2014).* (Ed.). Springer International Publishing. (ISBN: 978-3-319-02050-1.)

2. **Scanning tunneling microscopy (STM) of graphene.** Vázquez de Parga, A.L. and Miranda, R. in *Graphene: properties, preparation, characterization and devices*, Edited by V. Skákalová and A.B. Kaiser, ISBN: 978-0-85709-508-4 Woodhead Publisingh Group, Cambridge, United Kingdom (doi:10.1533/9780857099334.2.124)

3. **Bio-nanoimaging.** (2014). Hervás, R., Fernández-Ramírez, M. d. C., Abelleira, L. E., Laurents, D. V. & Carrión-Vázquez, M. Elsevier. (ISBN: 9780123944313.)

4. **Dual Role of Phthalocyanines in Carbon Nanostructure-Based Organic Photovoltaics.** (2014). A. de la Escosura, O. Trukhina, T. Torres,*Struct Bond,* **159**, 145-192 in *Fullerenes and Other Carbon-Rich Nanostructures* Springer-Verlag (Berlin)

3.1.3. Patents

Registered Patents

1. **Position sensitive photo detector:** OEPM; extended to USA, Europe and Japan. IMDEA 50%, CSIC 50%.License in negotiation with Hamamatsu

2. **Solid Support for Oligonucleotid Synthesises:** EPO; 100% IMDEA; License in negotiationwith Link Technologies

Filed Patents

1. **New method for the synthesis of Graphene Inks:** EPO; IMDEA 25%, UAM 25%, Abengoa Research 50%. Pre-Comercial Licence Agreement with Abengoa Research

2. **COF Covalent Organic Frameworks:** EPO; IMDEA 50%, UAM 40% and UCM 10%

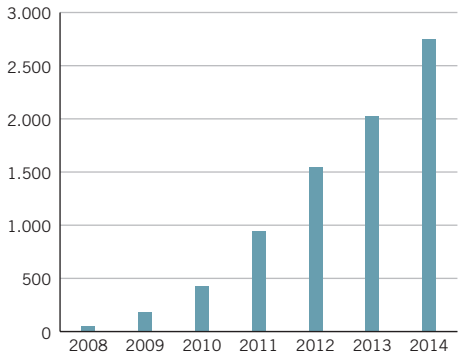
3. **Preparation of Porous Corrugated Graphene from Covalent Organic Frameworks for Super Capacitor Use.** OEPM; UVEG 70%, UAM 17,5%, IMDEA 12,5%

4. **Single-Point Mutation Detection in RNA Extracts using Gold Nanoparticles Modified with Hydrophobic Molecular Beacons:** EPO patent filed at OEPM IMDEA 60%, University of California at San Francisco 40%, Interintitutional Co-ownership agreement

5. **Detection and treatment of GNAQ mutant uveal melanoma cells with metallic nanoparticles:** USA patent filed at USPO: IMDEA 40%, University of California at San Francisco 40%, Interintitutional Co-ownership agreement

impact of the publications

Citations in each year

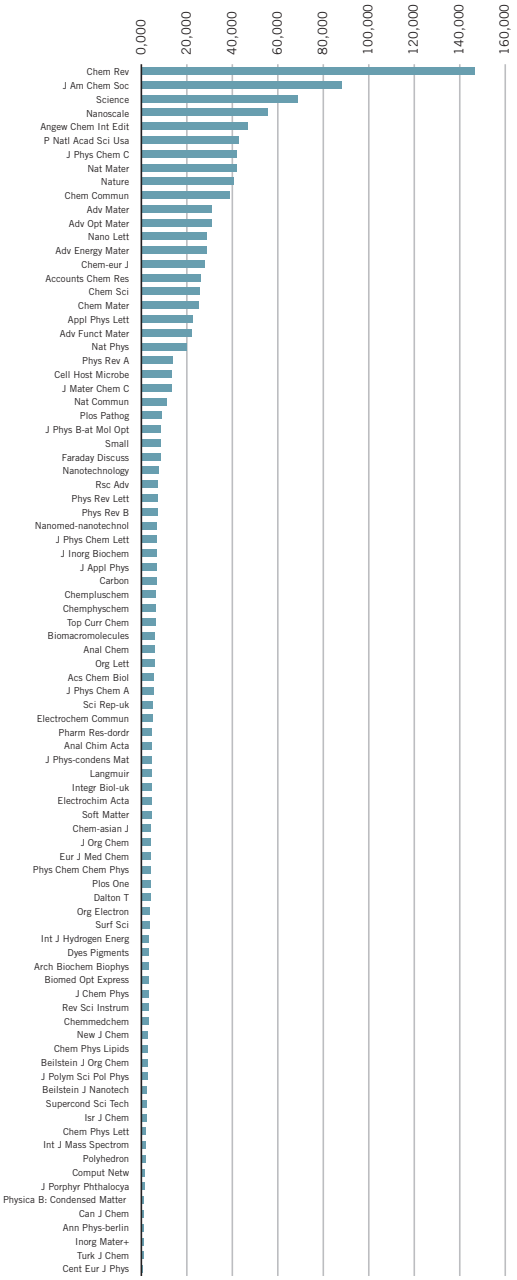


- **Sum of the times cited:** 8425
- **Sum of Times Cited without self-citations:** 7085
- **Average citation per item:** 12,65
- **h index:** 44
- **Papers (15 non indexed):** 179

1. **Periodically rippled graphene: growth and spatially resolved electronic structure.** Vazquez de Parga A. L.; Calleja F.; Borca B.; Guinea F. and Miranda R., *Phys. Rev. Lett.* TC: 308

Impact factor of the publications in 2014

Total indexed publications: 179
Average impact factor: 6,872



3.2. International Congresses: Invited Lectures and Regular Contributions

3.2.1. Invited lectures

05.-07.02.2014

5th Symposium on Computing pi-Conjugated Compounds (CPiC), Linköping, Sweden

Photophysics in Single- and Polycrystalline Organic Semiconductors
J. Gierschner

03-07.03.2014

Annual Meeting American Physical Society, Denver, USA

Vortex Pinning vs Superconducting Wire Network: Origin of Periodic Oscillations Induced by Applied Magnetic Fields in Superconducting Films with Arrays of Nanomagnets
J. L. Vicent

07-14.03.2014

International Winter School on Electronic Properties of Novel Materials, Krichberg im Tirol, Austria

Evidence of Long Range Magnetic Order in a Purely Organic 2D Layer Adsorbed on Nanostructured Graphene
A. L. Vázquez de Parga

11-14.03.2014

NanoSpain 2014 Madrid, Spain

Supramolecular Functionalization of Graphene with a Nonplanar Recognition Motif
N. Martín

16-20.03.2014

247th ACS National Meeting Dallas, Texas, USA

Subphthalocyanines: Active Molecules for Molecular Photovoltaics
T. Torres

Kinetic Effects in the Self-Assembly of Organic Molecules on Solid Surfaces
R. Otero

23-28.03.2014

European Conference Optical Nanospectroscopy I, Tübingen, Germany

Size Effects in Organic Semiconductor Photophysics
J. Gierschner

02-04.04.2014

VIII Meeting on Protein Structure and Function, Madrid, Spain

Repeat Protein Scaffolds for Assembly of Tailored Nanostructures
A. L. Cortajarena

21-25.04.2014

Symposium B: Organic and Inorganic Materials for Dye-Sensitized Solar Cells, 2014 MRS Spring Meeting, San Francisco, California, USA

Phthalocyanines and Subphthalocyanines for Molecular Photovoltaics
T. Torres

27-30.04.2014

3rd Solar Technologies go Hybrid (SolTech) Meeting, Wildbad Kreuth, Germany

Phthalocyanines and Subphthalocyanines as Components of Photovoltaic And Artificial Photosynthetic Systems
T. Torres

30.04-02.05.2014

11th Annual International Workshop on Nanomechanical Sensing (NMC 2014). Madrid, Spain

Mechano-selective Bacteria Surface Adhesion
I. Rodríguez

06-07.05.2014

Stem Cells from the Bench to the Bedside: Future Perspectives for Regenerative Medicine FNUSA-ICRC International Conference, Brno, Czech Republic

Progenitor Cells outside the Neurogenesis Niches in the Adult Human Brain.
A. Ayuso-Sacido

11-16.05.2014

225th ECS Meeting, Symposium M9: Porphyrins, Phthalocyanines and Supramolecular Assemblies, Orlando, Florida, USA

Artificial Photosynthetic Devices Based on Phthalocyanines
T. Torres

12-13.05.2014

2nd Sino-European Graphene Research Cooperation Meeting, IMDEA Nanociencia, Madrid, Spain

Towards Electroactive Graphene by Chemical Modification
N. Martin

18-23.05.2014

Nanax 6, Nanoscience with Nanocrystals, Salzburgo, Austria

Interfacing Quantum Dots and Graphitic Surfaces with Chloride Anions as Ligands
B. H. Juárez

25-30.05.2014

International Workshop "On-Surface Synthesis" Ecole de Physique des Houches, France

Metal-Organic Entities on Surfaces: from Discrete Molecules to Functional Polymeric Chains
F. Zamora

02-03.06.2014

International Symposium on Synthetic Two-Dimensional Polymers, Zurich, Switzerland

Covalent Organic Polymers based on Poliimines: materials for a rational design.
F. Zamora

02.06.2014

Symposium: Phthalocyanine Dyes and Carbon Nanostructures for Solar Energy Conversion, University of Aveiro, Aveiro, Portugal

Phthalocyanines and Phthalocyanine-Carbon Nanostructures for Photovoltaic and Artificial Photosynthetic Devices
T. Torres

18-20.06.2014

The 5th European Nanomanipulation Workshop, Mulhouse, France

Influence of Scan Pattern and Substrate Morphology on AFM Nanomanipulation
E. Gnecco

30.06-05.07.2014

22nd International Conference on the Science and Technology of Synthetic Metals (ICSM2014), Turku, Finland

Supramolecular Functionalization of Graphene with a Nonplanar Recognition Motif
N. Martín

03-04.07.2014

1st XLIC Work Group 1 (Ultrafast electron dynamics in molecules) Meeting, London, UK

Correlated Electron and Nuclear Dynamics in Molecular Photoionization and High-Harmonic Generation
F. Martín

06-09.07.2014

10th European Conference on Magnetic Sensors and Actuators (EMSA 2014) Vienna, Austria

Single-Molecule Manipulation of Nucleic Acids by Magnetic and Optical Fields
J.R. Arias-Gonzalez

09-12.07.2014
6th Conference on Elementary Processes in Atomic Systems (CEPAS 2014), Bratislava, Slovakia

Electron and Nuclear Dynamics in the Photoionization of Molecules
F. Martín

21-23.07.2014
Conference on Atomic and Molecular Physics: a joint Japanese and French view over 120 years, L'Abbaye des Vaux de Cernay, France

Deciphering Molecular Structure by Means of Vibrationally Resolved Photoelectron Spectroscopy
F. Martín

22-27.07.2014
8th International Conference on Porphyrins and Phthalocyanines (ICPP8), Turkey

Controlling the Spatial Arrangement of Subphthalocyanines
T. Torres

17-21.08.2014
REPM2014 - Rare Earth and Future Permanent Magnets and Their Applications Workshop 2014, Annapolis, USA

NANOPYME project: in the search of improved rare earth-free permanent magnets
A. Bollero

27-29.08.2014
4th Single molecule localization microscopy symposium King's College London, UK

Improving Super-Resolution Microscopy with Correlative Imaging
C. Flors

31.05-05.09.2014
30th European Conference on Surface Science, Dallas, USA

Charge Transfer between Donor-Acceptor Molecular Networks and Metal Surfaces
R. Otero

01-03.09.2014
New Advances in Carbon Nanomaterials. Faraday Discussion, 173, London, UK

Chiral Fullerenes by Asymmetric Catalysis: Applications in Materials Science?
N. Martín

7-12.09.2014
18th International Microscopy Congress. Prague, Czech Republic

Structure of Macromolecules and Macromolecular Assemblies
José L. Carrascosa (Chair) LS-4

08-10.09.2014
1st International Caparica Conference on Chromogenic and Emissive Materials Caparica, Portugal

Highly Luminescent Single Crystals for Organic Optoelectronics
J. Gierschner

08-10.09.2014
VI Encuentro de Física y Química de Superficies, Rio Cuarto, Argentina

Adding Magnetic Functionalities to Epitaxial Graphene
A.L. Vázquez de Parga

15-19.09.2014
E-MRS 2014 FALL MEETING (Symposium U), Warsaw, Poland

Basics on Nanomagnetism for Bio-Sensing and - Medical Applications
P. Perna

24-26.09.2014
Labelling & Nanoscopy, Heidelberg, Germany

Improving Fluorescence Labelling in Super-Resolution Microscopy with Correlative Imaging
C. Flors

29-30.09.2014
Nanonet Workshop 2014, Dresden, Germany

Molecular Electronics: Electrical properties for circuits based in single organic molecules
M. T. González

08-10.10.2014
Friction and Interface Dynamics at Nano and Mesoscales, Mulhouse, France

Friction Force Microscopy in Water and Applications to Controlled Nanomanipulation and Nanolithography
E. Gnecco

10.10.2014
1st Meeting of the CNB NanoBiomedicine Initiative, Madrid, Spain

Nanoparticle Uses in Nanomedicine: Nanoparticule Functionalization
A. L. Cortajarena

13.10.2014
Michinoku International Symposium on Porphyrins, Phthalocyanines, and Functional pi-Molecules (MISPPF), Mount Zao, Tohoku, Japan

Subphthalocyanines: Supramolecular Organization and Self-Assembling Properties
T. Torres

15-18.10.2014
IV Congress on New Technologies, Prevention and Insurance: The influence of internet, genetic engineering and nanotechnology in Medicine, Bogotá, Colombia

Nanoparticles as Sensors and Actuators in the Cell Interior
J.R. Arias-González

28-30.10.2014
NANOLITO Workshop 2014, Zaragoza, Spain

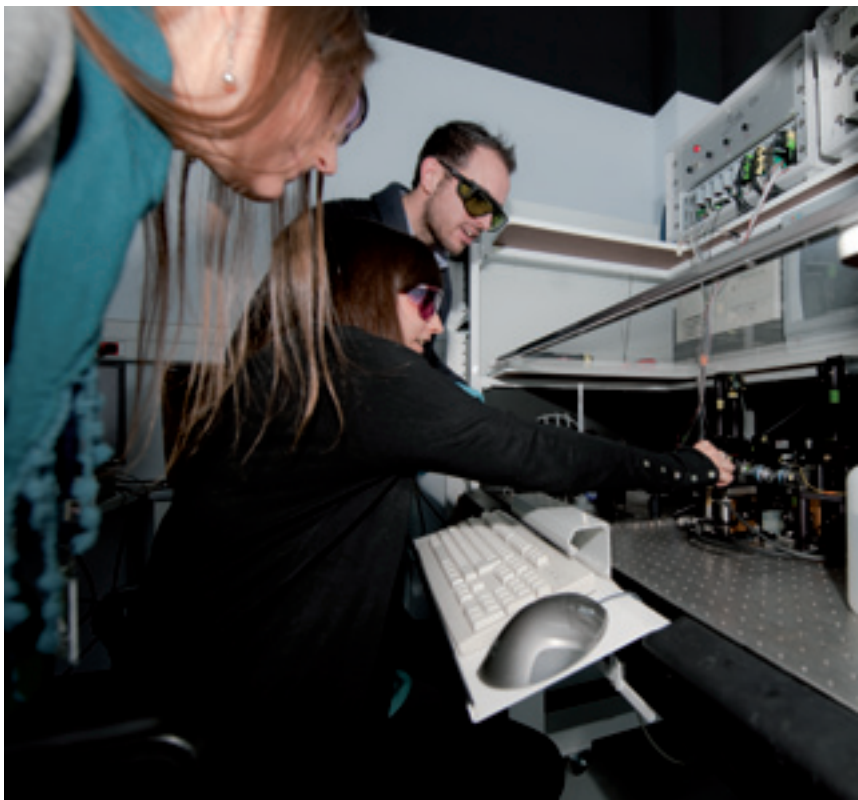
Topographical and Chemical Patterning of Functional Surfaces
I. Rodríguez

05-07.11.2014
CECAM Electron Dynamics on Surfaces and Nanostructures, Zaragoza, Spain

Adding Functionalities to Epitaxial Graphene by Self-Assembly on or below its Surface
A. L. Vázquez de Parga

26-28.11.2014
NanotechItaly2014, Venice, Italy

Back to the Future: Revisiting Ferrites with Nowadays Nano-Tools as Alternative to Rare-Earth Permanent Magnets
A. Bollero



3.2.2. Regular contributions

04-05.02.2014

2nd Meeting of the RSEQ Chemical Group, Bilbao, Spain

Poster Contribution

Repeat Protein Scaffolds for Assembly of Tailored Nanostructures

S.H. Mejías; P. Couleaud, S. Casado; Begoña Sot; J.M. Abad; A.L. Cortajarena

03-07.02.2014

Form and Function of Protein nanoshells: Assembly, Mechanics and Dynamics. Leiden, the Netherlands

Oral Contribution

The Interplay between Mechanics and Stability of Viral Cages

Mercedes Hernando-Pérez, Elena Pascual, María Aznar, Alina Ionel, José R. Castón, Antoni Luque, J.L.Carrascosa, David Reguera and Pedro J. de Pablo.

14-19.02.2014

58th Biophysical Society Meeting, San Francisco, USA

Oral Contribution

Identification of the Tranlocation Step of a Replicative DNA Polymerase

B. Ibarra

10-14.03.2014

NGC2014 Conference. Nano and Giga Challenges in Electronics, Photonics and Renewable Energy From Materials to Devices to System Architecture Symposium, Phoenix, USA

Oral Contribution

Multifunctional Magnetic Nanoparticles to Kill Selectively Cancer Cells

J. Camarero, F. J. Terán, G. Salas, D. Cabrera, S. M. Ocampo, M. P. Morales, A. Ayuso-Sacido, A. Cortajarena, A. Villanueva, C. Belda, and R. Miranda

24-28.03.2014

First Conference on Optical Nanospectroscopy, Tubingen, Germany

Oral Contribution

New Directions in Nanoscale Imaging of DNA

C. Flors

Poster Contribution

Highly Efficient Solid State Emission of Regio-Regular Polythiophene upon Dilution in a Conjugated Polymer Matrix

Longfei Wu, Santiago Casado, Larry Lüer, Ruidong Xia and Juan Cabanillas-González

08-09.04.2014

Multifun Meeting, University Hospital of Jena, Jena, Germany

Oral Contributions

Multifunctionalization of Magnetic Nanoparticles

Antonio Aires, Pierre Couleaud, Alfonso Latorre, Álvaro Somoza and Aitziber L. Cortajarena

Novel Multifunctionalization Strategies and Targeting in vitro Assay

Antonio Aires, Sandra M Ocampo, Pierre Couleaud, Alfonso Latorre, Álvaro Somoza and Aitziber L. Cortajarena

09.-11.04.2014

Industrial Technologies 2014, Athen, Greece

Project Stand

EU Project NANOPYME: In the Search of New Permanent Magnets

NANOPYME stand chosen by jury among the best 5 stands of the complete event (counting with > 100 stands)

A. Bollero and M.J. Villa

30.04-02.05.2014

11th Annual International Workshop on Nanomechanical Sensing-NMC 2014, Madrid, Spain

Poster Contribution

Mechano-Selective Bacteria Surface Adhesion

Felipe Viela, Manuel Rodríguez, Aitziber López Cortajarena, Santiago Casado, Jon Molina, and Isabel Rodríguez

04-08.05.2014

IEEE International Magnetics Conference, INTERMAG2014, Dresden, Germany

Oral Contributions

Origin of Anisotropic Giant Magnetoresistance in Magnetic Nanostructures
Paolo Perna; Davide Maccariello; C. Rodrigo; J.L. Fernández Cuñado; Alberto Bollero; M. Muñoz; J.L.Prieto; J. Akerman; M. Romera; Julio Camarero; Rodolfo Miranda

High Coercive Isotropic CoFe2O4 Powders obtained by Ultrafast Milling
F.J. Pedrosa, A. Quesada, E. Berganza, D. Granados, G. Rodríguez-Rodríguez, F. Rubio-Marcos, J.F. Fernández, J. Camarero, A. Bollero

SmCo5 (perpendicular) / CoFeB (in-plane) Bilayers: unprecedented isothermal tuning of the magnitude and sgn of the exchange-bias field
A. Bollero, F.J. Pedrosa, J.L.F. Cunado, J. Camarero, M. Seifert, V. Neu, V. Baltz, D. Serantes, O. Chubykalo-Fesenko, R.P. del Real, M. Vázquez, L. Schultz, B. Dieny, R. Miranda

Remanence Enhancement of Sr-Ferrite Alloyed with $Fe_{73.5}Si_{16.5}B_6Nb_3Cu_1$ Nanocrystalline Powder
A. M. Aragón, A. Bollero, A. Hernando, P. Marín

Four-fold Anisotropy Magnetite Films grown by Infrared-PLD with RT <100> Easy Axis Orientation
F.J. Pedrosa, J.L.F. Cuñado, J. Camarero, M. Sanz, M. Oujja, E. Rebollar, J.F. Marco, J. de la Figuera, M. Monti, M. Castillejo, M. García-Hernández, F. Mompean, N.M. Nemes, T. Feher, B. Nafradi, L. Forro, A. Bollero

Poster Contribution

Experimental Determination of Dynamical Hysteretic Processes in Superparamagnetic Iron Oxide Nanoparticles
D. Cabrera, G. Salas, T. Rincón, J. Camarero, and F.J. Terán

11-15.05.2014

E-MRS 2014 Spring Meeting, Symposium N Converging technology for nanobio-applications, Lille, France

Oral Contributions

Characterization of Nanocomposite Cobalt Ferrite/Magnetite Films grown by Pulsed Laser Deposition on SrTiO3 Substrates
M. Sanz, M. Oujja, E. Rebollar, J.F. Marco, J. de la Figuera, M. Monti, A. Quesada, A. Bollero, J. Camarero, F.J. Pedrosa, M. Castillejo

Modulation of Heating Mechanisms in Monodisperse and Crystalline Iron Oxide Nanoparticles by Magnetic Dipolar Interactions
G. Salas, J. G. Ovejero, D. Cabrera, J. Camarero, M. Varela, R. Ludwig, H. Dahring, I.Hilger, R. Miranda, M.P. Morales, and F.J. Terán

11-15.05.2014

HOPV 14 Hybrid and Organic Photovoltaics, Lausanne, Switzerland

Poster Contribution

Irreversible Photo-oxidation Effects in P3HT: PCBMand Si-PCPDTBT: PCBM Films: A time domain study
S. Karuthedath, T. Sauermann, H-J. Egelhaaf, R.Wannemacher, L. Lüer

14-16.05.2014

Conferencia Española de Nanofotónica (CEN2014), Santander, Spain

Oral Contribution

E-beam Assisted Etching and Patterning of Few-layer Molybdenum Disulfide
Ramón Bernardo Gavito; Manuel Rodríguez Osorio; Rodolfo Miranda Soriano; Daniel Granados Ruiz

15.05.2014

Conferencia Española de Nanofotónica (CEN2014), Santander, Spain

Poster Contributions

E-beam Assisted Etching and Patterning of Few-layer Molybdenum Disulfide
Ramón Bernardo Gavito; Manuel Rodríguez Osorio; Rodolfo Miranda Soriano; Daniel Granados Ruiz

18-23.05.2014

Nanax 6, Nanoscience with Nanocrystals, Salzburgo, Austria

Poster Contributions

Surface Composition Controls the Optical Properties of Alloyed QDs encapsulated in Silica Shell
María Acebrón; Juan Galisteo; D. Granados; J. M. Gallego; R. Otero, Cefe López, Beatriz H. Juárez

Fine Tuning of Size and Polydispersity of Hollow Carbon Spheres
Luz Carime Gil-Herrera, Beatriz H. Juárez, Cefe López

Surface Characterization of CdSe-Au Hybrid Nanoparticles by Cyclic Voltammetry and X-ray Photoelectron Spectroscopy
L. de la Cueva, M. Meyns, K. Klinke J. M. Gallego, R. Otero, C. Alonso, B. H. Juárez

Halogen Compounds as Additives for Shape Tuning in CdSe Nanocrystal Synthesis
Michaela Meyns, Fabiola Iacono, Cristina Palencia, Jan Geweke, Mauricio D. Coderch, Úrsula E. A. Fittschen, José M. Gallego, Roberto Otero, Beatriz H. Juárez, Christian Klinke

Laser Heating Tunability by Off-Resonant Irradiation of Gold Nanoparticles trapped in Optical Tweezers
Silvia Hormeño, Paula Gregorio-Godoy, Jorge Pérez-Juste, Luis M. Liz-Marzán, Beatriz H. Juárez, J. Ricardo Arias-González

26-28.05.2014

30 Years of Colloidal Quantum Dots, Paris, France

Poster Contributions

Surface Composition Controls the Optical Properties of Alloyed QDs encapsulated in Silica Shell
María Acebrón; Juan Galisteo; D. Granados; J. M. Gallego; R. Otero, Cefe López, Beatriz H. Juárez

Interfacing Quantum Dots and Graphitic Surfaces with Chloride Anions as Ligands
C. Palencia, F. Iacono, L. de la Cueva, M. Meyns, C. Klinke, K. Lauwaet, J.M. Gallego, C. Alonso, R.Otero, B.H. Juárez

26-29.05.2014

1st European Workshop on Understanding and Controlling Nano and Mesoscale Friction, Can Picofort, Mallorca, Spain

Oral Contribution

Towards Nano-Morphology Screening of Organic Semiconductors: Molecular Level Resolution of a Single Crystal in Water using Friction Force Microscopy J. Gierschner

Poster Contribution

Nanoscale Ripple Patterns as a Playground for AFM Lithography and Manipulation Experiments
P. Pedraz, P. Nita, S. Casado, F. Buatier de Mongeot, and E. Gnecco

30-03.06.2014

ASCO Annual Meeting 2014, Chicago, USA

Poster Contribution

High Level of Suppressor-of-Fused (SuFu) Expression and Tumor Cells Dissemination in Human Glioblastoma[1].
Noemí García-Romero, María Peris-Celda, Josefa Carrión-Navarro, Cristina Zahonero, Carmen Escobedo, Pilar Sánchez, Cristina González Pérez, Esther Holgado, Ricardo Prat, Cristobal Belda-Iniesta, Ángel Ayuso-Sacido

08-13.06.2014

CIMTEC 2014 – 13th International Conference on Modern Materials and Technologies, Tuscany, Italy

Oral Contribution

Influence of Mechanical Milling on Properties of SrFe12O19 and SrFe12O19/Fe0.65Co0.35; SrFe12O19/FeCoSiB Hard/Soft Magnetic Nanocomposite
M. N. Guzik, S. Deledda, B. C. Hauback, A. Bollero, E. Berganza, A. Quesada, J.F. Fernández, A. M. Aragón, P. Marín

1 Published at J Clin Oncol 32, 2014 (suppl; abstr e22118)

10-13.06.2014

XIV Congress of Spanish Biophysical Society, Alcalá de Henares, Spain

Oral Contributions

Functional Nanostructures by Designed Protein Self-Assembly
Sara H. Mejías, Pierre Couleaud, Javier López, Begoña Sot, Carmen Atienza, Teresa González, Nazario Martín, Aitziber L. Cortajarena

Single Molecule Mechanical Characterization of the Interaction of the Human Mitochondrial SSB Proteins with DNA
Morín JA, Kaguni LS, Ibarra B.

Poster Contribution

Mechanochemical Kinetics of DNA Replication
Ibarra B, Morín JA, Cao JM, Lázaro FJ, Valpuesta JM, Salas M, Carrascosa JL.

10-14.06.2014

10th International Conference on the Scientific and Clinical Applications of Magnetic Carriers (2014) Dresden, Germany

Oral Contribution

Reproducible Microwave Synthesis of Multi-Core Iron Oxide Nanoparticles for Magnetic Hyperthermia and in situ Tracking of Induced Cell Death in a Human Melanoma DX3 Cell Model
C. Blanco-Andújar, P. Southern, D. Ortega, S. A. Nesbitt, Nguyen T. K. Thanh and Q. A. Pankhurst

Poster Contribution

Highly Controllable Microwave Synthesis of Biocompatible Iron Oxide Nanoparticles with Tailored Magnetic Relaxation Properties
C. Blanco-Andújar, P. Southern, D. Ortega, C. Johansson, Nguyen T. K. Thanh and Q. A. Pankhurst

15-19.06.2014

European Workshop on Epitaxial Graphene and 2D Materials, Primosten, Croatia

Oral Contribution

Adding Magnetic Functionalities to Graphene by Self Assembly
F. Calleja, H. Ochoa, M. Garnica, S. Barja, J.J. Navarro, A. Black, A.L. Vázquez de Parga, F. Guinea and R. Miranda

22-27.06.2014

Gordon Research Conference. Three Dimensional Electron Microscopy. Technical Advances for a Rising Star in structural Biology, Girona, Spain

Poster Contribution

Conformational Changes Leading to DNA Delivery in T7 Bacteriophage upon Receptor Interaction
Cuervo A., González-García V., Pulido M., Chagoyen M., Arranz R., Castón J.R., Fernández J.J., García-Doval C., Valpuesta J.M., Camacho A., van Raaij M.J., Martín-Benito J. and Carrascosa J.L.

25-26.06.2014

4th Early Stage Researchers Workshop in Nanoscience, Madrid, Spain

Oral Contributions

Functional Nanostructures by Designed Protein Self-Assembly
Sara H. Mejías, Pierre Couleaud, Javier López, Begoña Sot, Carmen Atienza, Teresa González, Nazario Martín, Aitziber L. Cortajarena.

Influence of Biological Matrix on Nanomagnetism of Iron Oxide Nanoparticles
D. Cabrera, G. Salas, S.M. Ocampo, J. Camarero and F.J. Terán

Poster Contributions

High coercivity Isotropic CoFe2O4 Powders obtained by Ultrafast-Milling for Permanent Magnet Applications
F.J. Pedrosa, K.M. Golasisnski, F. Rubio-Marcos, A. Quesada, M.R. Osorio, D. Granados, G. Salas, M.N. Guzik, S. Deledda, J.F. Fernández, J. Camarero, and A. Bollero

Isotropic SrFe12O19 Powders obtained by Rapid milling for Permanent Magnet Applications
K.M. Golasisnski, F.J. Pedrosa, E. Céspedes, G. Rodríguez Rodríguez, M.R. Osorio, D. Granados, J. Camarero and A. Bollero

Mechano-Selective Bacteria Surface Adhesion
Felipe Viela, Manuel Rodríguez, Aitziber López Cortajarena and Isabel Rodríguez

E-beam Assisted Etching and Patterning of Few-layer Molybdenum Disulfide
Ramón Bernardo Gavito; Manuel Rodríguez Osorio; Rodolfo Miranda Soriano; Daniel Granados Ruiz

22-27.06.2014

8th International Conference on Porphyrins and Phthalocyanines (ICPP8), Turkey

Oral Contribution

Synthesis, Characterization and Photophysical Properties of Novel Corannulene- and Cyclopenta[hi]aceanthrylene-based Phthalocyanine Derivatives

Giovanni Bottari, Beatriz Ballesteros, Juan A. Suanzes, Rafael Krick Calderon, Dirk M. Guldi, Tomás Torres

30.06.2014

Workshop on Iron in Disease, Diagnosis and Treatments, Madrid, Spain

Oral Contribution

Toxicity and Biodistribution Study after Chronic Oral Exposure to Iron Oxide Nanoparticles

S. Chamorro, A. Brenes, L. Gutiérrez, G. Salas, D. Verdoy, and F. J.Terán

30.06.-05.07.2014

International Conference on Synthetic Metals Turku, Finland

Oral Contributions

Size Effects in Organic Semiconductor Photophysics

J. Gierschner

Highly Air-stable Low-threshold Deep Blue lasing in H-Shaped Oligofluorenes

Gonzalo del Pozo, Marta Mróz, Santiago Casado, Larry Lüer, Yan Qian, Qi Wei, Qi Zhang, Linghai Xie, Ruidong Xia, Wei Huang, Juan Cabanillas-González

30.06.-04.07.2014

Electronic and magnetic properties of chiral structures and their assemblies, Telluride (Colorado), USA

Poster Contributions

Magnetic Microspectroscopy and Dichroic Effects in X-Ray Absorption by Adsorbed Thin Films of Chiral Molecules

M.A. Niño, F.J. Luque, J.J. de Miguel, P.Perna, R. Miranda, I. Kowalik, L. Aballe, M. Foerster, D. Arvanitis

Enanstiospecific Spin Polarization of Electrons Photoemitted through Layers of Homochiral Molecules

J.J. de Miguel, M.A. Niño, I. Kowalik, F.J. Luque, D. Arvanitis, R. Miranda

Structural and Electronic Characterization of Adsorbed Layers of Chiral Molecules by X-Ray Absorption

F.J. Luque, M.A. Niño, I. Kowalik, D. Arvanitis, R. Miranda, J.J. de Miguel

01-04.07.2014

9th Congress on Electronic Structure Principles and Apllications, Badajoz, Spain

Poster Contributions

Is C50 a superaromat? Evidence from electronic structure and ring currents

Ana Sanz-Matias, A, Ceulemans and M. Alcami

Understanding Soft-Landing of Small Ions on Self-assembled Monolayers

S.A. Vázquez, J.J. Nogueira, Y. Wang, F. Martín, M. Alcami, D.R. Glowacki, D. Shalashilin, E. Paci. A. Fernández-Ramos, W.L. Hase and E. Martínez-Núñez

06-09.07.2014

UK Colloids 2014 (2014) London, UK

Poster Contribution

Estimating the Power Absorption of Tailored Iron Oxide Nanoparticles from AC Susceptibility Measurements

C. Blanco-Andújar, D. Ortega, P. Southern, C. Johansson, N. T. K. Thanh and Q. A. Pankhurst

10-13.07.2014

International Symposium on Spin-Polarized Electron Physics and Nanomagnetism, Halle, Germany

Poster Contribution

Spin Polarization of Electrons Photoemitted through Layers of Homochiral Organic Molecules

M.A. Niño, I. Kowalik, F.J. Luque, D. Arvanitis, R. Miranda, J.J. de Miguel

27-30.07.2014

Protein Society Meeting, San Diego, USA

Poster Contribution

Repeat Protein Scaffolds for Assembly of Functional Nanostructures

S.H. Mejías; P. Couleaud, Begoña Sot; J.M. Abad; A.L. Cortajarena

03-07.08.2014

2014 International Biophysics CongressBrisbane, Australia

Poster Contribution

A Multimodal Approach to the Study of Magnetic Nanoparticles Interaction with Breast Cancer Cells

Michele Chiappi, José J. Conesa, Eva Pereiro, Maria J. Rodríguez, Francisco J. Chichón, José L. Carrascosa.

17-21.08.2014

REPM2014 - Rare Earth and Future Permanent Magnets and Their Applications Workshop 2014, Annapolis, USA

Poster Contributions

High coercivity Isotropic CoFe2O4 Powders obtained by Ultrafast-Milling

A. Bollero, F.J. Pedrosa, K. Golasisnski, A. Quesada, F. Rubio-Marcos, M.N. Guzik, S. Deledda, J.F. Fernández, J. Camarero, D. Granados

Unprecedented Tuning of the Magnitude and Sign of the Loop Shift in Orthogonally Coupled $SmCo_5$ (perpendicular) / CoFeB (in-plane) Bilayers

F.J. Pedrosa, J.L.F. Cuñado, J. Camarero, M. Seifert, V. Neu, V. Baltz, D. Serantes, O. Chubykalo-Fesenko, R.P. del Real, M. Vázquez, L. Schultz, B. Dieny, A. Bollero

24-29.08.2014

7th International Conference on Molecular Electronics Elecmol 2014, Strasbourg, France

Oral Contribution

Mechanically Interlocked Nanotubes

E. Pérez

Poster Contribution

Conductance, Voltage-current Characteristics, and Thermopower Measurements for Molecular Junctions of Oligo(phenyleneethynylene) Derivatives

M. Teresa González, Edmund Leary, Charalambos Evangeli, Delia Miguel, Ana Martín-Lasanta, Gabino Rubio-Bollinger, Nicolás Agraït

31.08.-05.09.2014

ECOSS Antalya, Turkey

Oral Contribution

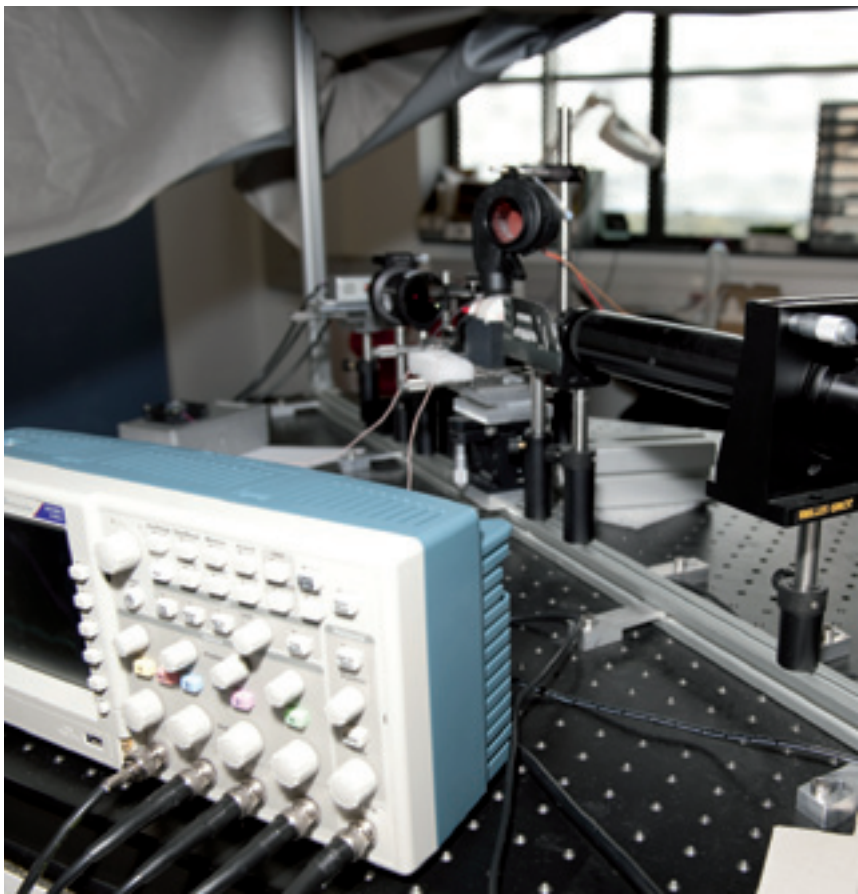
Enanstiospecific Spin Polarization of Electrons Photoemitted through Layers of Homochiral Organic Molecules

M.A. Niño, I. Kowalik, F.J. Luque, D. Arvanitis, R. Miranda, J.J. de Miguel

Poster Contribution

Large X-ray Circular Dichroism in Adsorbed Films of Homochiral Organic Molecules

F.J. Luque, I. Kowalik, M.A. Niño, D. Arvanitis, R. Miranda, J.J. de Miguel



31.08.-04.09.2014

NFO 13-International Conference on Near-Fiel Optics, Nanophotonics and Related Techniques, Salt Lake City, USA

Poster Contributions

E-beam Assisted Patterning of Few-Layer MoS2
Ramón Bernardo Gavito; Manuel Rodríguez Osorio; Rodolfo Miranda Soriano; Daniel Granados Ruiz

Magnetoplasmonic Nanorings as Novel Architectures with Tunable Magneto-Optical Activity in Wide Wavelength Ranges
Hua Yu Feng, Feng Luo, Renata Kekesi, Daniel Granados, David Meneses Rodríguez, Jorge M. García, Antonio García Martín, Gaspar Armelles, and Alfonso Cebollada

7-12.09.2014

18th International Microscopy Congress, Prague, Czech

Oral Contribution

Three-Dimensional Architecture of Hepatitis C Virus Replication Factory Studied by Soft X-Ray Cryo-Tomography
Pérez-Berna A.J., Rodríguez M.J. Friesland M. Sorrentino A., Chichón F.J., Carrascosa J.L. Gastaminza P. Pereiro E.

Poster Contribution

Conformational changes leading to DNA delivery in T7 bacteriophage upon receptor interaction.
Cuervo A., González-García V., Pulido M., Chagoyen M., Arranz R., Castón J.R., Fernández J.J., García-Doval C., Valpuesta J.M., Camacho A., van Raaij M.J., Martín-Benito J., Carrascosa J.L.

EFTEM-TomoJ: software for 3D chemical mapping by EFTEM and soft X-ray NEXAFS tomography.
Messaoudi C., Aschman N., Cunha M., Oikawa T., Sorzano C. O., Conesa J.J., Chiappi M., Pereiro E., Chichón F.J., Carrascosa J.L., Marco S.

Correlative microscopy characterization of the interaction of magnetic nanoparticles with breast cáncer cells by Soft X-ray tomography, epi-fluorescent optical and trasmission lectron microscopy.
Chiappi M., Chichón F.J., Conesa J.J., Pereiro E., Rodríguez M.J., Carrascosa J.L.

07-12.09.2014

16th International Congress on Photobiology, Cordoba, Argentina

Oral Contribution

Improving Fluorescence Labelling in Super-Resolution Microscopy with Correlative Imaging
A. Monserrate, S. Casado, C. Flors

15-19.09.2014

E-MRS 2014 Fall Meeting (Symposium U), Warsaw, Poland

Oral Contributions

Origin of Anisotropic Giant Magnetoresistance in magnetic nanostructures
P. Perna, D. Maccariello, J. L. F. Cuñado, M. Muñoz, J. L. Prieto, A. Bollero, J. Pedrosa, F. Ajejas, M. A. Niño, J. Camarero and R. Miranda

Influence of Biological Matrix on the Nanomagnetism of Iron Oxide Nanoparticles
F. J. Terán, P. Perna, G. Salas, D. Cabrera, S. M. Ocampo, M. P. Morales, A. Ayuso-Sacido, A. L. Cortajarena, A. Somoza, A. Villanueva, J. Camarero, and R. Miranda.

Basics on Nanomagnetism for Bio-Sensing and -Medical Applications
P. Perna, F. J. Terán, J. Camarero, and R. Miranda

Poster Contribution

Tailoring Magnetic Anisotropy in Half-Metallic Epitaxial La0.7Sr0.3MnO3 Thin Films
Paolo Perna; Davide Maccariello; Laurence Méchin; Stephane Flament; Julio Camarero; Rodolfo Miranda

24-26.09.2014

12th European Conference on Thermoelectricity (ECT2014), Madrid, Spain

Oral Contribution

Electrical Conductivity Measurements of Thin Film Samples
Miguel Muñoz Rojo, C. V. Manzano, O. Caballero-Calero, D. Granados, M. R. Osorio, T. Borca Tasciuc, M.S. Martín-González

29.09-01.10.2014

International Workshop "Controlled Charge and Heat Transport at the Molecular Scale". University of Konstanz, Germany

Oral Contribution

Thermopower and Conductance of Molecules and Contacts
N. Agrait

Poster Contributions

A Molecular Platinum Cluster Junction: A Single-Molecule Switch
Linda A. Zotti, Edmund Leary, María Soriano Juan Carlos Cuevas and Juan José Palacios

STM-Break Junction Study of Extended-Tetrathiafulvalene Cruciform Molecules
Edmund Leary Christian R. Parker M. Teresa González Karsten S.Jennum, Charalambos Evangeli Gabino Rubio-Bollinger Mogens Brøndsted Nielsen, Nicolas Agrait

01-03.10.2014

Molesco Workshop, Konstanz, Germany

Oral Contribution

Comparing the Transport Properties of Various Oligo(phenyleneethynylene) Analogs
M. Teresa González, Edmund Leary, Delia Miguel, Ana Martín-Lasanta, Charalambos Evangeli, Gabino Rubio-Bollinger, Nicolás Agraït

06-08.10.2014

ISOS 7 International Summit on OPV Stability, Barcelona, Spain

Poster Contribution

The Effect of Oxygen Induced Degradation on Charge Carrier Dynamics in P3HT: PCBM and Si-PCPDTBT:PCBM Thin Films and Solar Cells
S. Karuthedath, T. Sauermann, H-J. Egelhaaf, R.Wannemacher, L. Lüer

28-30.10.2014

NANOLITO Workshop 2014, Zaragoza, Spain

Oral Contributions

Nanostructuration as a Way to induce a Vortex Smectic Phase in Nb Thin Films
J. del Valle, A. Gómez, F. Gálvez, M. Rodríguez, D. Granados, E.M. González and J.L. Vicent

E-beam Assisted Patterning of Few-Layer MoS2
Ramón Bernardo Gavito; Manuel Rodríguez Osorio; Rodolfo Miranda Soriano; Daniel Granados Ruiz.

Interplay between Vortex Matter Phases and Arays of Pinning Centers in Low Temperature Superconductors
Javier del Valle, Alicia Gómez, Fernando Gálvez, Manuel Rodríguez, Daniel Granados, Elvira M. González and José L. Vicent

Poster Contribution

Mechano-Selective Bacteria Surface Adhesion
Felipe Viela, Manuel Rodríguez, Aitziber López Cortajarena, Santiago Casado, Jon Molina, and Isabel Rodríguez

02-05.11.2014

2014 NCRI Cancer Conference, Liverpool, UK

Poster Contribution

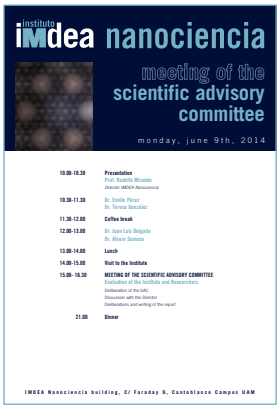
Cellular Accumulation, Lipophilicity and Photocytotoxicity of Diazido Platinum(IV) Anticancer Complexes
Ana M Pizarro, Ruth J McQuitty, Fiona S Mackay, Yao Zhao, Julie A Woods, Peter J Sadler

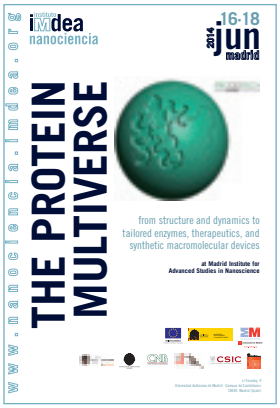
03-07/11/2014

MMM Conference 2014 - 59th Annual Magnetism and Magnetic Materials, Honolulu, USA

Oral Contributions

Remanence and Energy Product Enhancement in Isotropic $CoFe_2O_4$/FeCo Composites
C. Granados, A. Quesada, F. Rubio-Marcos, M. Stingaciu, M. Christensen, F.J. Mompean, M. García-Hernández, J. Pedrosa, A. Bollero, J.F. Fernández





14.11.2014

Frontiers in Surface and Materials Science: Theory and Practice, Barcelona, Spain

Poster Contribution

Adsorption of Benzene on Cu(100) and on Cu(100) Covered with an Ultrathin NaCl

M. Robledo, G. Pacchioni, F. Martín, M. Alcamí and S. Díaz-Tendero

01-02.12.2014

Multifun Meeting, King's Collge London – London, England

Oral Contribution

Multifunctionalization of Magnetic Nanoparticles

Pierre Couleaud, Antonio Aires, Alfonso Latorre, Álvaro Somoza and Aitziber L. Cortajarena

02-05.12.2014

Solid State and Organic Lighting, Canberra, Australia

Oral Contribution

Efficiently Lowering ASE Threshold by using a Novel Oligomer as Host in Solid Mixtures of F8BT/DPh

Ruidong Xia, Qi Zhang, Qi Wei, Yan Qian, Larry Lüer, Santiago Casado, and Juan Cabanillas-González

workshops & courses

3.3. Workshops & courses (co)-organized by IMDEA Nanociencia

27-31.01.2014

Workshop on pi-Conjugated Organic Materials for Optoelectronic Applications, IMDEA Nanociencia, Madrid, Spain

Organization: J. Gierschner, L. Lüer, R.Wannemacher

02-06.02.2014

XVI Escuela Nacional de Materiales Moleculares, Gandía, Spain

http://www.icmol.es/XVENMM/

Organization: F. Zamora (Local Committee Member)

30.03-02.04.2014

MOLESCO Kick-Off Meeting, IMDEA Nanociencia, Madrid, Spain

Organization: IMDEA Nanociencia

12-13.05.2014

2nd Sino-European Graphene Research Cooperation Meeting, IMDEA Nanociencia, Madrid, Spain

Organization: Feng Luo

26-29. 05.2014

1st European Workshop on Understanding and Controlling Nano and Mesoscale Friction, Can Picofort, Mallorca, Spain

http://www.nanotribo.info/cost/index.php/78-cost/71-home

Organization: E. Gnecco

09.06.2014

Scientific Advisory Committee Meeting IMDEA Nanociencia, Madrid, Spain

Organization:IMDEA Nanociencia

16-18/06/2014

The Protein Multiverse. PRODESTECH Meeting. IMDEA Nanociencia, Madrid, Spain

Organization: V. Muñoz

25-26.06.2014

4th Early Stage Researchers Workshop, IMDEA Nanociencia, Madrid, Spain

Organization: IMDEA Nanociencia

26-29.08.2014

23rd Congress of the International Commission for Optics (ICO-23), Santiago de Compostela, Spain

http://ico23.org/site/web/varios/welcome.php

Organization: J.R. Arias-González (Local Committee Member)

29-31.10.2014

16th Workshop on Dynamical Phenomena at Surfaces (WDPS16), IMDEA Nanociencia, Madrid, Spain

http://campusys.qui.uam.es/?page_id=737

Organization: F. Martín

20-21/11/2014

Reunión del Club Español de Magnetismo. Capítulo Español de la IEEE Magnetic Society. IMDEA Nanociencia, Madrid, Spain

Organization: D. Ortega & A: Bollero

Invited Lecturer: Prof. Albert Fert (NP Physics 2007)

3.4. Seminars

Forthcoming

4th Early Stage Researchers Workshop
Wednesday 25 & Thursday 26 June 2014

08/01/2014

Towards a Science of Simplicity: Simple Nanofabrication and Paper-based Microfluidics

Dr. Ramsés V. Martínez

IMDEA Nanociencia (present address: Whitesides Group. Department of Chemistry and Chemical Biology, Harvard University.

17/01/2014

All Oxide Magnetic Field Sensors

Dr. Rubén Guerrero

Institute d'Electronique Fondamental Université Paris Sud (CNRS, 91405 Orsay France

21/01/2014

The Centre of Nanofabrication at IMDEA Nanoscience: past, present and future of an odyssey

Dr. Daniel Granados

IMDEA Nanociencia, Spain

28/01/2014

Iron Oxide Nanoparticles for Magnetic Heating Applications

Dr. Franciso Terán

IMDEA Nanociencia, Spain

27 & 30/01/2014

From single molecule to atomic-friction: estimating free energy landscapes

Dr. Ronen Berkovich

Ben-Gurion University of the Negev, Beer-Sheva, Israel

11/02/2014

Atom intercalation underneath graphene

Dr. Fabián Calleja

IMDEA Nanociencia, Spain

13/02/2014

Aromaticity in fullerenes and endohedral metallofullerenes. Effects on electronic structure, molecular structure, and reactivity

Prof. Miquel Solà

Institut de Química Computacional i Catàlisi and Department de Química, University of Girona, E-17071 Girona, Catalonia, Spain

Computational insights into the chemical reactivity of Endohedral Metallofullerenes

Dr. Marc Garcia Borràs

Institut de Química Computacional i Catàlisi and Department de Química, University of Girona, E-17071 Girona, Catalonia, Spain

Exploring the chemical structure and properties of fullerene-based materials through computations

Dr. Silvia Osuna

Institut de Química Computacional i Catàlisi and Department de Química, University of Girona, E-17071 Girona, Catalonia, Spain

21/02/2014

TADF materials & New Deep Blue Emitting Copolymers

Dr. José Manuel Santos Barahona

Department of Chemistry Durham University, South Road, Durham, DH1 3LE United Kingdom

25/02/2014

NanoBioMedicine initiative at IMDEA nanoscience

Dr. Ángel Ayuso

CIOCC-IMMA Fundación Hospital de Madrid, HM Group & IMDEA Nanociencia

26/02/2014

NMR and molecular recognition. Carbohydrate-Protein Interactions

Dr. Jesús Jiménez-Barbero

Chemical and Physical Biology, Centro de Investigaciones Biológicas, C.S.I.C., 28040 Madrid, Spain

11/03/2014

Metallodrug design in cancer research

Dr. Ana Pizarro

IMDEA Nanociencia, Spain

14/03/2014

Quantum Plasmon Resonances Controlled by Molecular Tunnel Junctions

Dr. Christian A. Nijhuis

Prof. at the Chemistry Depart of the National University of Singapore. Department of Chemistry, 3 Science Drive 3, Singapore 117543

25/03/2014

Liquids on and in protein and virus fibres

Dr. Alexander Bittner

Ikerbasque Research Professor CIC-Nanogune, Donosti, Spain, Self-assembly group

08/04/2014

Molecule-based Magnets: New Materials for this Millennium

Prof. Joel S. Miller

Laboratoire de Chimie des Substances Naturelles, Universit de Limoges, France

10/04/2014

Electronic states at donor-acceptor/metal interfaces probed with electron spectroscopies: NEXAFS, XPS and UPS

Dr. J. Enrique Ortega

Departamento de Física Aplicada I, UPV/EHU, San Sebastián, Centro de Física de Materiales (CFM), (CSIC-UPV/EHU), San Sebastián, Donostia International Physics Center (DIPC), San Sebastián

Molecule-based Magnets: New Materials for this Millennium
Prof. Joel S. Miller
Laboratoire de Chimie des Substances Naturelles, Universit de Limoges, France

22/04/2014
Luminescent Nanoprobes for Thermal Biosensing: towards controlled photothermal therapies
Dr. Daniel Jaque
Fluorescence Imaging Group, Departamento de Física de Materiales, Facultad de Ciencias, Universidad Autónoma de Madrid, 28049 Madrid, Spain

29/04/2014
Computing Natural Compounds for an Atomistics-cale Understanding
Dr. Patrick Trouillas
Université de Limoges, France

06/05/2014
Collecting Photoelectrons: chemical characterization of organic and inorganic surfaces
Dr. Cristina Navío

20/05/2014
Molecular Thinking for Nanoplasmonic Design
Dr. Andrés Guerrero Martínez
Departamento de Química Física I. Universidad Complutense de Madrid, Spain

23/05/2014
Active Plasmonics. Towards a Dynamic Control of Resonant Phenomena
Dr. Braulio García-Cámara
Grupo de Displays y Aplicaciones Fotónicas Departamento de Tecnología Electrónica Universidad Carlos III de Madrid, Spain

05/06/2014
Low Field Magnetoresistance at Room Temperature in La0.7Sr0.3Mn03 Thin Films
Dr. L. Méchin
GREYC (UMR6072) CNRS ENSICAEN Université de Caen Basse- Normandie

06/06/2014
Operando Methods for the Characterization of Energy Materials
Prof. Héctor Abruña
Department of Chemistry & Chemical Biology and Energy Materials Center at Cornell University

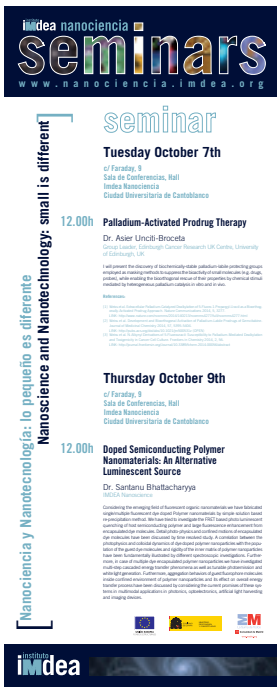
10/06/2014
Force-dependent Melting of Supercoiled DNA at Thermophilic Temperatures
Dr. Eric Galburt
Biochemistry and Molecular Biophysics Washington University School of Medicine in St. Louis, USA

02/07/2014
Multiple Excitons Fine Structure in a Single CdTe/CdTexSe1-x Colloidal Quantum Dot
Dr. Efrat Lifshitz
Schulich Faculty of Chemistry, Russell Berrie Nanotechnology Institute, Technion, Solid State Institute, Haifa 32000, Israel

21/09/2014
Imaging and Spectroscopy of Surface Plasmons with Electron Microscopes
Dr. Javier García de Abajo
Instituto de Ciencias Fotónicas (ICFO) Barcelona

07/10/2014
Palladium - Activated Prodrug Therapy
Dr. Asier Unciti-Broceta
Edinburgh Cancer Research UK Centre, University of Edinburgh, UK

09/10/2014
Doped Semiconducting Polymer Nanomaterials: An Alternative Luminiscent Source
Dr. Santanu Bhattacharyya
IMDEA Nanociencia



15/10/2014

Multidentate Polimeric Ligands for Long-term Bio-imaging using Higly Stable and Functionalized Quantum Dots

Dr. Emerson Giovanelli
ESPCI ParisTech, France

31/10/2014

Designing Materials for Biomedical Applications

Dr. María Concepción Serrano López-Terradas
Laboratory of Neural Repair and Biomaterials.
Hospital Nacional de Parapléjicos. Toledo, Spain

04/11/2014

Origin of Life from Nanoscience

Dr. José Ángel Martín-Gago
Instituto de Ciencia de Materiales CSIC Cantoblanco, Madrid

Light-driven Molecular Motion and Light-driven Modification of Molecular Properties

Dr. James A. Hutchison
ISIS & icFRC, Université de Strasbourg & CNRS, 8 allée Gaspard Monge, 67000 Strasbourg, France

05/11/2014

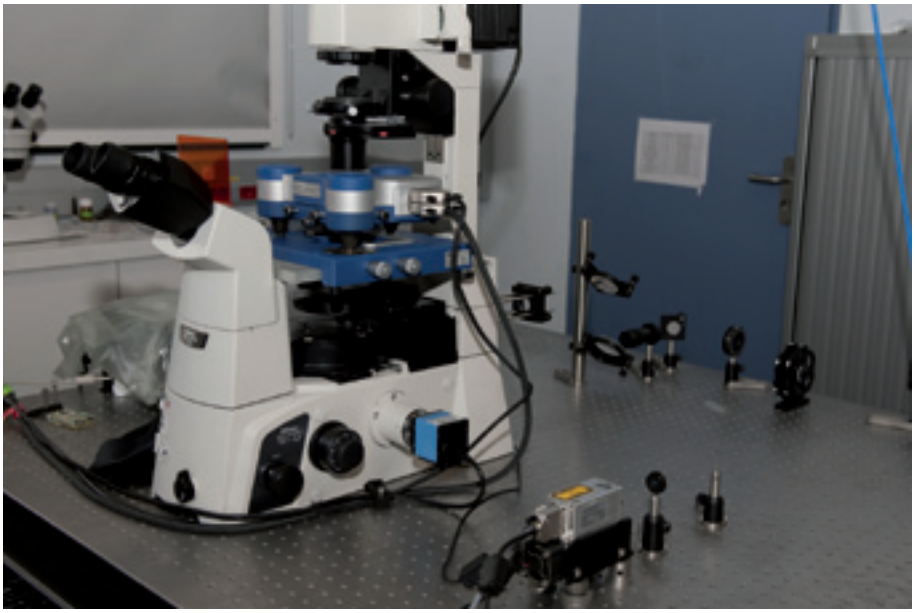
Epitaxial Rare-Earth Cobalt Thin Films and Multilayers: tuning anisotropies and functionality

Dr. Volker Neu
Institute for Metallic Materials, IFW-Dresden (Germany)

18/11/ 2014

Flexible Hybrid Nanostructures for Applications as Ultraviolet Radiation Protection Optical Filters

José Raúl Castro Smirnov
Multifunctional Optical Materials Group, Institute of Materials Science of Seville, Seville, Spain



3.5. Projects

3.5.1. International programmes

MOLESCO

MOLECULAR-SCALE ELECTRONICS: Concepts, Contacts and Stability

Funding: FP7-PEOPLE-2013-ITN-nº 606728
Consortium of 10 european partners coordinated by the University of Durham, UK
Duration: 2014-2017
IMDEA Reserach Team: Prof. Nazario Martín, Nicolas Agrait
https://www.dur.ac.uk/chemistry/molesco/

The MOLESCO network will create a unique training and research environment to develop a pool of young researchers capable of achieving breakthroughs aimed at realising the immense potential of molecular electronics. In part this will involve the major challenges of design and fabrication of molecular-scale devices. To deliver this step-change in capability, MOLESCO will coordinate the activities of internationally-leading scientists from six different countries. MOLESCO has secured the participation of nine private sector partners, including one of Europe's leading industrial electronics-research laboratories (IBM Research–Zurich) as a full partner. A highly-integrated approach to the experimental and theoretical aspects of molecular-scale electronics will deliver the fundamental knowledge and new fabrication strategies needed to underpin future nanotechnologies targeted for electronics applications. MOLESCO represents a highly interdisciplinary and intersectoral collaboration between teams with an extensive portfolio of skills, including molecular synthesis, fabrication of molecular junctions, imaging of molecular junctions with atomic resolution, measurements of charge transport, and electronic structure and transport calculations.

MOLHREOSTAT

Downhill Folding Protein Modules as conformational Rheostats: Roles in Molecular Biology and Applications in Biosensors

Funding: ERC-2012-ADG_20120314-no 323059
Duration: 2014-2018
IP: Prof. Víctor Muñoz (CNB-CSIC).
IMDEA Nanociencia as third party linked to CSIC via the "*Unidad de Nanobiotecnología CNBCSIC-IMDEA Nanociencia Joint Unit CNBCSIC*"

Protein folding and function is a perfect arena towards growing the grassroots of quantitative and synthetic biology. This is so because all cellular processes controlled by proteins can ultimately be traced back to physico-chemical properties encoded in their aminoacid sequences. MOLRHEOSTAT is framed within these goals, focusing on the investigation of novel connections between protein folding and function via a multidisciplinary approach that combines experiment (single molecule spectroscopy, high-resolution NMR, protein engineering and design), theory and computer simulations. Conventionally, proteins are portrayed as conformational switches that fold and function by flipping between an on-state (native, active) and an off-state (inactive, unfolded) in response to stimuli. However, last years have witnessed the discovery of protein modules that undergo continuous conformational changes upon unfolding (downhill folding).

MOLRHEOSTAT aims at investigating the functional and technological implications of downhill folding. The goal is to determine whether downhill folding modules can be exploited to build conformational rheostats; that is, proteins that continuously modulate a signal or response at the single molecule level by tuning their folding conformational ensemble. Conformational rheostats could open a new realm of applications as synthetic biomolecular devices as well as regulatory mechanisms for controlling complex biochemical processes carried out by macromolecular assemblies.

These ideas will be explored on two specific objectives:

1. Implementation of a general approach for building high-performance, ultrafast, single-molecule sensors based on downhill protein folding modules.

2. Analysis of the roles of conformational rheostats in the regulation of three fundamental processes in molecular biology (coordination in protein networks, DNA sliding and homing-to-target of transcription factors, and molecular springs in macromolecular assemblies).

RADIOMAG

Multifunctional Nanoparticles for Magnetic Hyperthermia and Indirect Radiation Therapy

Funding: European Science Foundation, TD Pilot COST Action TD1402
Duration: 2014 - 2018
Chair: Dr. Simo Spassov (Centre de Physique du Globe de l'Institut Royal Météorologique de Belgique)
Vice Chair: Dr. Daniel Ortega
http://www.cost.eu/COST_Actions/TDP/Actions/TD1402

In recent years, the emerging field of nanotechnology has paved its way into cancer treatment procedures with the use of nanoparticles for contrast media and therapeutic agents. The combination of conventional cancer therapies with nanotechnologies has shown to be promising in individual clinical studies and bears an enormous potential for the treatment individualisation tailored according to the patients needs.

This COST Action aims at teaming experienced scientists and young researchers from nanophysics, chemical sciences and medicine for improving the knowledge of combined cancer therapies. Particular attention will be paid to the increase of the radiotherapy efficiency and its combination with magnetic hyperthermia. These new findings, obtained under the coordination framework of this action, will results in a better dose optimisation confining cell damage to tumour regions only, under concurrent exploitation of sophisticated radio-surgical tools already available in hospitals. Furthermore, proper dissemination of scientific results to the broad public and possible stakeholders is another important concern of this action.

The improved knowledge resulting from the proposed coordinated, target-oriented interdisciplinary exchange will encourage industrial partners to produce a new generation of magnetic nanoparticles suitable for diagnosis, chemotherapy, radiotherapy and magnetic hyperthermia. Promoting the application of combined cancer treatments will contribute to a better individualised treatment planning for cost-efficient cancer therapies covered by state health insurances.

Magnetocaloric effect in nanostructured materials

Funding: Royal Society of Chemistry (UK)
Duration: 2014-2015
IP: Dr. Daniel Ortega

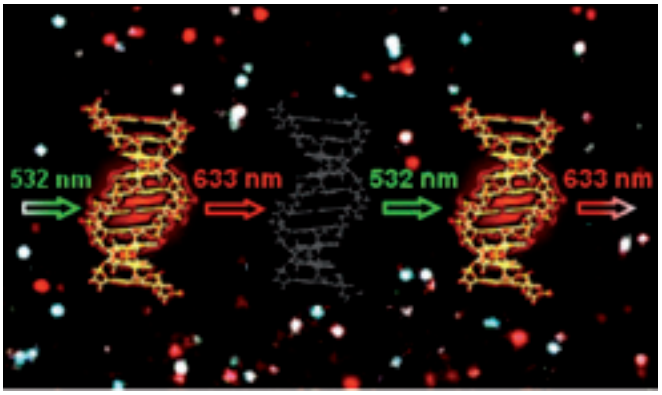
Magnetocaloric (MC) and giant-magnetocaloric (GMC) materials, those showing a reversible temperature change in response to a changing magnetic field are key for the development of magnetic refrigeration at room temperature. This technology would reduce considerably the current consumption of electricity caused by refrigeration and air-conditioning. Scaling these down to the nanoscale opens up a new range of applications for MC and GMC materials: lighter and highly permeable MC materials for small devices or nanofluids for more efficient cooling systems for high-power- density devices. Furthermore, it has been envisioned that MC and GMC nanomaterials would contribute to cater the new demands of modern medicine, especially diagnostics and therapeutics. Besides exploring the MC effect at the nanoscale, this project is devoted to design MC and GMC nanomaterials for technological and medical applications.

ImaginDNA

"Advanced DNA imaging: improving spatial resolution and contrast through photoswitching"

Funding: FP7-PEOPLE-2011-CIG nº 303620
Duration: 2013-2017
Principal Investigator: Dr. Cristina Flors

Fluorescence photoswitching constitutes the core of the recently developed "super-resolution" imaging techniques, which are able to improve spatial resolution in fluorescence microscopy beyond the diffraction limit of light. Recent advances in fluorescence photoswitching have also impacted the development of other microscopy techniques such as optical lock-in detection (OLID) imaging. OLID imaging uses fluorescence photoswitching to improve image contrast, instead of spatial resolution. To fully realize the great potential of these advanced imaging methods, novel strategies to label cell components with photoswitchable fluorophores in high density are needed. This project aims at developing new and better ways to engineer fluorescence photoswitching in DNA. Different strategies to introduce desirable properties such as reversible fluorescence photoswitching, high labelling density and control over DNA sequence will be developed throughout the project.

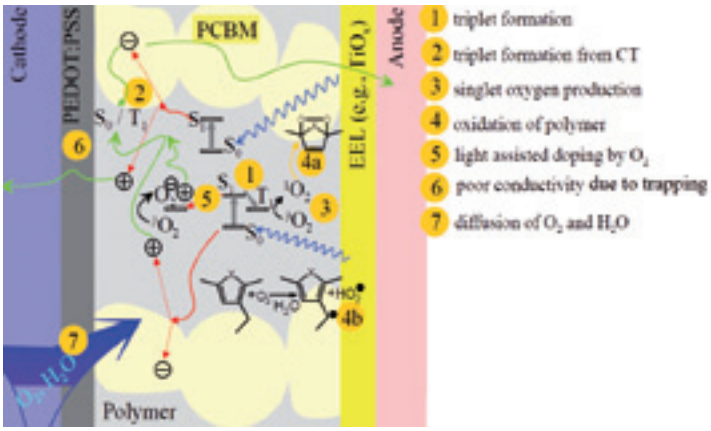


SolarRevolution

"Revolutionizing Understanding of Organic Solar Cell Degradation to Design Novel Stable Materials"

Funding: FP7-PEOPLE-2012-IEF nº 331795
Duration: 2013-2015
Principal Investigator: Dr. Michael Wykes

SolarRevolution aims to revolutionize the understanding of bulk-heterojunction organic solar cell (OSC) degradation by developing a detailed knowledge of the chemical and physical processes involved. This knowledge will be applied to the rational design of novel materials to give OSCs 20-year lifetimes and allow mass-market uptake of this low-cost, low-energy-footprint, transparent, lightweight and flexible technology. Quantumchemical modelling of degradation mechanisms will provide detailed and experimentally-inaccessible insight. This will dramatically enhance the clarity and robustness of experimental conclusions, leading to a deeper understanding of OSC degradation. Diffusion of oxygen into OSCs and the subsequent photochemical reactions represent the dominant source of degradation of the photoactive layer. Quantum-chemical calculations will characterize the chemical species and photochemical reactions involved in degradation. Semiclassical models will reveal how degraded materials impact exciton and polaron dynamics, and hence OSC efficiency. Finally, our new understanding of degradation will be exploited in the design and in-silico screening of novel materials for stable OSCs. Close collaborative links with leading academic and industrial groups will be forged via host-participation in the pan-European OSC research project ESTABLIS (FP7-ITN-290022). Two-way knowledge-transfer under strict IP control will: i) provide SolarRevolution with state-of-the-art materials and experimental data, and ii) allow hypotheses and novel material designs generated by SolarRevolution to be experimentally verified and industrially trialled. This will ensure that SolarRevolution will be well-positioned to contribute to high-impact publications and patent filings, raising Europe's profile in OSC research and establishing the fellow, Michael Wykes, as a leading researcher in the field.



XUV/X-ray light and fast ions for ultrafast chemistry (XLIC)

Funding: European Science Foundation. CMST COST Action CM1204
Duration: 2013-2017
Chair of the Action: Manuel Alcamí

The use of novel light sources and fast ions is opening new avenues in the study of chemical reactivity. XUV/X-ray pulses with attosecond duration permit to "visualize" the movement of electrons inside a molecule and a much better control of chemical reactions. X-ray Free Electron Lasers, synchrotrons or collision with fast ions can be used to generate molecules in highly excited and highly charged states that present new and unexpected reactivity.

The study of molecules under these extreme intensities and time resolution conditions requires new theoretical models that can serve as guidance for experiments. The scientific objective of the is to understand, monitor and control the complex ultrafast electronic and nuclear dynamics that occur in medium-sized and large molecules, to develop new control strategies of reactions and to develop a new generation of ultrafast spectroscopies combining attosecond temporal and sub-Angstrom spatial resolutions.

This is an interdisciplinary field in which European groups are very active but work separately. COST is thus the perfect framework to enhance exchange of knowledge, bringing together leading experts in generating, manipulating and modeling these new phenomena. The collaboration between groups will reinforce the European leadership in XUV/X-ray-, attosecond-, synchrotron- and ion-based research in chemistry.

http://www.cost.eu/domains_actions/cmst/Actions/CM1204

NanoSpectroscopy

Funding: European Science Foundation. MPNS COST Action MP1302
Duration: 2013-2017
Participants: Dr. Johannes Gierschner & Dr. Cristina Flors

With today's research and industry aiming for ever smaller objects and feature sizes, there is an increasing demand for spectroscopic methods to investigate processes, objects, and material properties with unprecedented spatial and temporal resolution as well as chemical specificity. The new insights are important for issues such as understanding life on the (sub-)cellular level, light-matter-interaction, light-to-energy conversion, or materials engineering. The interdisciplinary approach of nanospectroscopy encompasses the fields of Physics, (Bio-)Chemistry, Biology, Medicine, Nanotechnology, and Materials Science.

Optical nanospectroscopy uses methods such as confocal and/or ultrafast Raman and fluorescence spectroscopy for the detection and spectral analysis of objects at the nanoscale, down to the single-molecule level. In this Action, nanospectroscopic techniques will be applied to tailored materials and nanostructures (organic/inorganic, semiconducting, metallic, hybrid, bio) to gain deeper understanding of nanoscale processes.

COST NanoSpectroscopy aims at consolidating European expertise on all aspects of UV/Vis/NIR nanospectroscopy (modelling, experiment, nanostructures, materials, equipment, applications) into one coherent Action. The COST networking approach is particularly well suited for this purpose. A training program will be established to spread the know-how of applying nanospectroscopic techniques and the gained insights. In dialogue with European industry, nanospectroscopic techniques will be further developed, e.g. as applied techniques for non-specialists.

http://www.cost.eu/domains_actions/mpns/Actions/MP1302

Understanding and Controlling Nano and Mesoscale Friction

Funding: European Science Foundation. MPNS COST Action MP1303
Duration: 2013-2017
Participants: Dr. Enrico Gnecco

Recent years have seen widespread efforts to understand the mechanisms of friction and tribology in micrometric structures (mesoscale) down to the realm of atoms and molecules (nanoscale) with the ultimate goal of controlling friction, adhesion and wear by design. This research has generated an interdisciplinary scientific area, nanotribology, with great potential impact on technology and everyday life. Applications include safety, economy, life quality, energy and material saving, toward a sustainable development. Europe has a strong scientific nanotribology community spreading over physics, materials science, chemistry, earth and life sciences.

The goal of this COST Action, operating beyond the national horizons, is to mobilize and put together the critical mass of existing human and technical nanotribology resources at a modest price, thus representing a unique opportunity for an efficient scientific investment. IMDEA Nanociencia will have a leading role in this Action, since an IMDEA Senior Researcher, Dr. Enrico Gnecco, will be one of the two Spanish representatives in the Management Committee of the Action. The research topics currently investigated by his group (nanoscale friction in liquid environments, manipulation of nanoparticles by scanning prove microscopy, influence of mechanical vibrations on friction and nanomanipulation, modeling atomic-scale friction and nanomanipulation) will greatly benefit from the interactions which will be estalished by this project and other groups at IMDEA Nanociencia may join the initiative in the near future.

In summary, the MP1303 COST Action aims to promote conferences, short-term scientific exchanges, training schools and common publications within the 14 countries participating in the project (Austria, Denmark, Finland, France, Germany, Ireland, Israel, Italy, Netherlands, Portugal, Spain, Switzerland, Turkey and United Kingdom). The Action is expected to end in May 2017.

http://www.cost.eu/domains_actions/mpns/Actions/MP1303

SEVENTH FRAMEWORK PROGRAMME

NANOPYME

"Nanocrystalline Permanent Magnets Based on Hybrid Metal-Ferrites"

Funding: FP7-NMP-2012-SMALL-6 nº 310516
Partners: Consortium of 11 European partners coordinated by IMDEA Nanociencia
Duration: 2012-2015
Coordinator: Dr. Alberto Bollero
http://nanopyme-project.eu/

Permanent magnets are key elements of technological devices used in motors, generators, information storage and many more nowadays applications. E.U. industries depend critically on the production of such type of magnets which are based on rare-earths metals. However most of the mines and reserves of rare-earths are controlled by emerging countries (mainly China) that started recently to develop their own technological devices instead of simply exporting the raw materials. Moreover E.U. companies do not produce rare-earth magnets. Rare-earths represent the group with the highest supply risk.

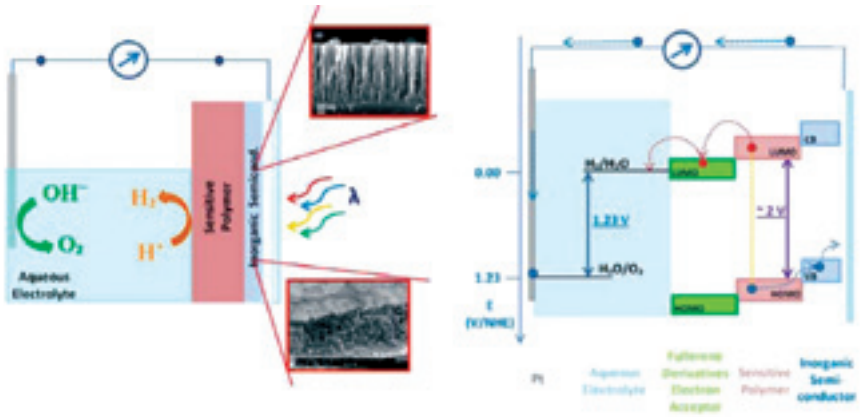
NANOPYME addresses the design and development of permanent magnets without rare-earths, consisting on hybrid nanostructures based on metals and ferrite oxides. Project relies on key advances in the fields of nanoscience, materials fabrication and processing. These newly designed rare-earth free permanent magnets will guarantee their use in a broad spectrum of technological applications which are currently covered by more expensive low energy-range rare-earth permanent magnets. This is crucial in order to allow E.U. technological companies to be competitive in the global market.

PHOCS

"Photogenerated Hydrogen by Organic Catalytic Systems"

Funding: FP7-ENERGY-2012-1-2STAGE nº 309233
Partners: Consortium of 7 European partners coordinated by the Fondazione Istitute Italiano di Technologia, Geneve, Italy
Duration: 2012-2015
Principal Investigators: Dr. Nazario Martin & Dr. Juan Luis Delgado

Aim of the project "Photogenerated Hydrogen by Organic Catalytic Systems (PHOCS)" is the realization of a new-concept, photoelectrochemical system for hydrogen production, based on the hybrid organic/inorganic and organic/liquid interfaces. PHOCS takes the move from the recent demonstration of reduction/oxidation reactions taking place, under visible light and at zero bias, at the interface of an organic semiconductor and an aqueous electrolyte, obtained by the coordinator's group. PHOCS intends to combine the visible-light absorption properties of organics, together with the enhanced charge transport capabilities of inorganic semiconductors, in order to build a hybrid photoelectrode for hydrogen generation. New organic donor and acceptor materials (conjugated polymers and fullerenes derivatives) will be synthesized, properly tuning HOMO-LUMO levels position and energy gap extent for semi-water splitting purposes. Final aim of PHOCS project is the realization of a solar-to-hydrogen energy conversion efficient device, as a tangible first step towards the new "organic water splitting" technology.



(Left) Schematic of the hybrid organic/inorganic water splitting system. The visible light sensitive polymer is put directly in contact to an aqueous electrolyte and coupled the nanostructured inorganic semiconductor electrode. (Right) Representative energy level diagram for the final hybrid, photoelectrolytic device.

POCAONTAS

"Polymer-Carbon Nanotubes Active Systems for Photovoltaics"

Funding: FP7-PEOPLE-2012-ITN nº 316633
Partners: Consortium of 9 European partners coordinated by IMDEA Nanociencia.
Duration: 2012-2016
Coordinator: Dr. Larry Luer
http://pocaontas-network.eu/

The goal of the POCAONTAS network is to offer training opportunities to 14 research fellows in the field of of organic solar cells based on blending organic materials with carbon nanotubes. Polymer-Carbon Nanotubes Active Systems for Photovoltaics (POCAONTAS) is a training network coordinated by IMDEA Nanoscience that brings together top European players in the field of Organic Solar Cells (OSC) offering a unique opportunity for research career development. POCAONTAS will train a total of 14 researchers in the development of highly efficient and stable OSC based on tailored blends of polymers with single wall carbon nanotubes (SWNT) that are well suited for OSC due to their inherent extremely high stability, high carrier mobility and tunabilityof optical gaps.

ESTABLIS

"Ensuring STABiLIty in organic Solar cells"

Funding: FP7-PEOPLE-2011-ITN nº 290022
Partners: Consortium of 9 European partners coordinated by the University of Pau and the Pays de L´Adour, France.
Duration: 2012-2015
IMDEA Research Team: Dr. Larry Luer
http://www.project-establis.eu/

The ITN ESTABLIS will train a team of 11 PhD Fellows and 4 Postdoctoral Fellows Establis in the development of materials and techniques for cheap, flexible and stable organic solar cells (OSCs). The task of IMDEA within the EU network ESTABLIS is to understand how degradation in organic solar cells influences the photovoltaic event chain, that occurs on time scales from 100 fs (charge transfer) up to microseconds (charge extraction).

Consequently, the first step was to build up and optimize our main research tools: micro-second pump-probe spectroscopy, photo-induced absorption spectroscopy and femto-second spectroscopy. The set-up for microsecond pump-probe spectroscopy has now a

noise level in the 10^-7 region, and is thus internationally competitive. Moreover, a set up for time resolved photovoltage has been built up, in order to benchmark electrical and optical information from the solar cells under study. One of our aims is to understand why oxygen reduces OSC's efficiency. Fig. 1 shows how the presence of oxygen reduces the extraction of charge carriers in OSCs.

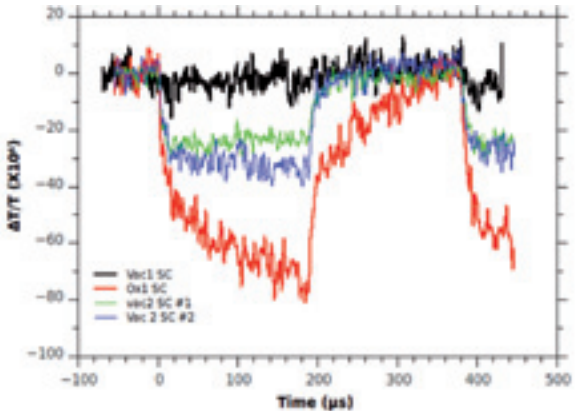


Fig.1. Optical detection of charge carriers in an organic solar cell under short circuit (SC) conditions via their induced absorption (negative differential transmission, ΔT/T, at 980nm. A highly efficient pristine solar cell (black curve) does not accumulate charges at all, because of efficient extraction. After oxygen sorption (red curve), a strong charge accumulation is found after light on at 0 μs, clearly showing that extraction is no longer complete. The process is partially reversible after annealing in vacuum (Vac2) (green and blue curves). Karuthedath, et al., to be published.

MINT

"Mechanically Interlocked Carbon Nanotubes"

European Research Council
Established by the European Commission

Funding: ERC-2012-StG_20111012 nº 307609
Duration: 2012-2017
Principal Investigator: Dr. Emilio Pérez

We present a plan to design, synthesize and exploit the properties of mechanically interlocked carbon nanotubes (MINTs). The scientific aim of the project is to introduce the mechanical bond as a new tool for the derivatization of carbon nanotubes. The mechanical link combines the advantages of covalent and supramolecular modifications, namely: kinetic stability (covalent) and conserved chemical structure (supramolecular). Besides this, its dynamic nature opens up unique opportunities for both fundamental studies and applications. From a technological point of view, MINTs should have a practical

impact in the fields of molecular electronics and molecular machinery. A general modular approach to MINT-based materials for photovoltaic devices and electrochemical sensors is presented. We also expect to exploit the rigidity and low dimensionality of SWNTs to construct molecular machines that utilize them as tracks to move across long distances, which is not possible in small-molecule molecular machines. To achieve these goals we will exploit the PI's expertise in the chemical modification of carbon nanostructures, the self-assembly of electroactive materials and the synthesis and characterization of mechanically interlocked molecules.

NANOTEST

"Fabrication and development of nanotoxicology-test bacterial arrays for the investigation of antibiotics against multi drug-resistant bacteria"

Funding: FP7-PEOPLE-2010-IOF nº 275148
Duration: 2012-2015
Principal Investigator: Dr. Ramsés V. Martínez

Bacterial resistance to antibiotics is one of the most important problems to be solved in medicine. Most antibiotics are effective against 99.9% of the target microorganisms. However, the remaining ones carry mutations that allow resistance against that particular drug which are transmitted to their progeny, making them immune to the treartment. Therefore, new strategies are necessary for the design of antibiotics able to circumvent bacterial resistance.

During the last decade we have developed many nanoscale systems to effectively transport drugs whose efficiency has not been properly evaluated due to the lack of a reliable technique for individually confining microbes. During the last year, our research has been focused on the development of a new toxicological test based on individual confinement bacteria. We have developed microfluidic systems for microbiology applications using soft lithography. By combining micro-printing of bacteria with microfluidic devices a new generation of toxicology tests for bacteria have been developed (See Figure 1) which will help to study the toxicological effects of certain medications using nanoparticles with small bacterial colonies.

In order to deposit small bacterial colonies on a flat substrate (sealed by the microfluidic system) the microcontact printing (MCP) technique will be used. Subsequently, the devise will be closed by inserting a number of microfluidic channels which then will by used to flux different concentrations of antibiotic to establish its toxological effect on the printed bacteria.

At present, the research is focused on testing the proper periodicity of the microfluidic channels, to maximize the interaction of the printed bacteria (currently, the E.coli AW405 strain) with different fluids introduced in the microfluidic device.

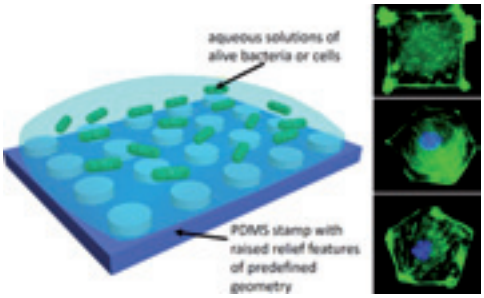


Figure 1. Left: Method for the patterning alive bacteria or cells using micro-contact printing. Right: Confocal microscope images showing the control on the shape of the printed cells. Each cell has a surface of approximately 900 μm²) Images obtained by fluorescence microscopy of cells confined to various shapes (all with areas of 900 μm²). The cells were stimulated with PDGF and stained with phalloidin and 4'-6-Diamidino-2-phenylindole to visualize F-actin (green) and nuclei (blue).

Organic position sensitive photodetectors

Funding: Chinese Scholarship Council Call 2011
Duration: 2012-2016
Principal Investigators: Dr. Juan Cabanillas, Dr. Feng Luo, Dr. Miguel Ángel Niño & Dr. Paolo Perna

This research line aims at developing organic photodetectors based on multilayer small molecules which deliver a linear change in photocurrent depending on the position of the impinging light on the pixel. The idea to produce spatial tuning of photocurrent in one single pixel exploits optical interference in multilayer structures as well as antibatic photocurrent response [1]. We have recently developed devices able to monitor lateral displacements with a spatial sensitivity close to 500 mm [2].

[1] J. Cabanillas-González and M. Campoy-Quiles, PCT/ES2011/070841.
[2] J. Cabanillas-González et al., Appl. Phys. Lett. 99, 103305 (2011).

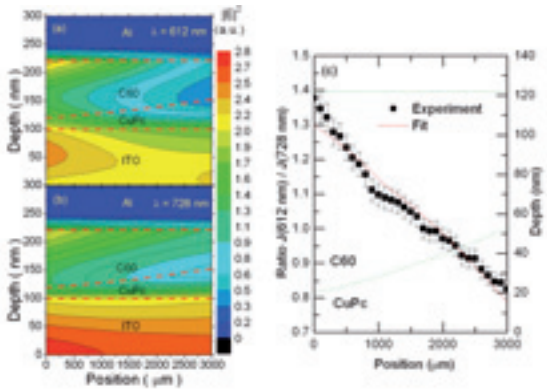


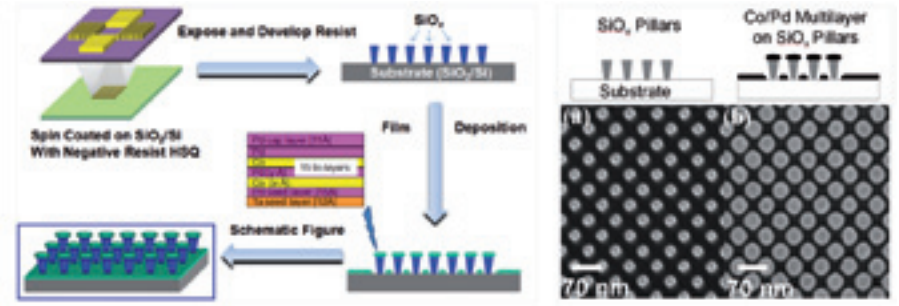
Figure. (Left) Optical modelling of the in-depth distribution of light across a multilayer photodetector. (Right) Dependence of photocurrent as a function of position.

Multilevel magnetic recording in bit patterned media for areal densities above 5 Terabit-per-square-inch

Funding: Chinese Scholarship Council Call 2011
Duration: 2012-2016
Principal Investigator: Dr. Feng Luo

The project aims at developing a new magnetic recording media at a proof-of-concept level for ultrahigh density magnetic storage applications, by using low-cost, environmentally friendly processes, and both advanced and new nanotechnologies.[1] It has been shown that 40 nm period island arrays with almost perfect ordering on flat SiO2 substrate surfaces can be achieved and 25 nm period patterns have already been demonstrated. With further reducing the dimension of the interference mask of EUV-IL or optimizing the e-beam lithography parameters, the sub-20 nm period pattern can be achieved. [2-3]

[1] F. Luo, L.J. Heyderman, H.H. Solak, T. Thomson, and M.E. Best, Appl. Phys. Lett. 92, 102505 (2008).
[2] P. Kanberberger, F. Luo, et al, Applied Physics Letters, 95, 023116 (2009).*
[3] F. Luo, et al, J. Nanosci. Nanotechnol., 12, 2484 (2012).*



Figures: (Left) Schematic Figure of fabrication of patterned magnetic arrays; (Right) SEM image of 50 nm-period SiOx pillars and magnetic dot arrays

Other research projects currently running at IMDEA Nanociencia Institute are:

MULTIFUn

"MultiFunctional Nanotechnology for Selective Detection and Treatment of Cancer"

Funding: FP7-NMP-2010-LARGE-4 nº 262943-2
Partners: Consortium of 16 European partners coordinated by ATOS Origin and IMDEA Nanociencia (Scientific coordination)
Duration: 2011-2015
Principal Investigators: Dr. Rodolfo Miranda, Dr. Francisco Terán, Dr. Aitziber López-Cortajarena & Dr. A. Somoza

The aim of the MultiFun consortium is to develop and validate a novel and minimally-invasive nanotechnology system to improve cancer diagnosis and treatment. MultiFun nanotechnology is based on multifunctionalised magnetic nanoparticles (MNP) to selectively target and eliminate breast and pancreatic cancer (stem) cells. The improved magnetic features of the MultiFun MNP will lead to medical applications such as contrast agents and magnetic heating inductors. Moreover, MNP can be functionalised with ligands in order to facilitate tumour diagnosis by MRI. Targeting peptides and antibodies will be employed against cancer (stem) cells leading to early cancer detection, an increase of the effectiveness and reducing side effects. The same MNP will be used simultaneously as functional nanocarriers and heating inductors in order to provide a multimodal therapeutic modality. The synergistic effects of drugs, peptides, small RNAs and heat will be evaluated to determine the effectiveness of different therapeutic combinations.

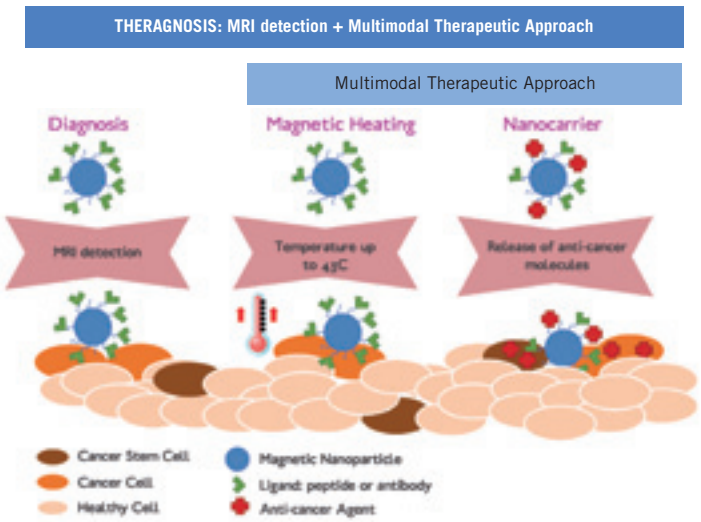


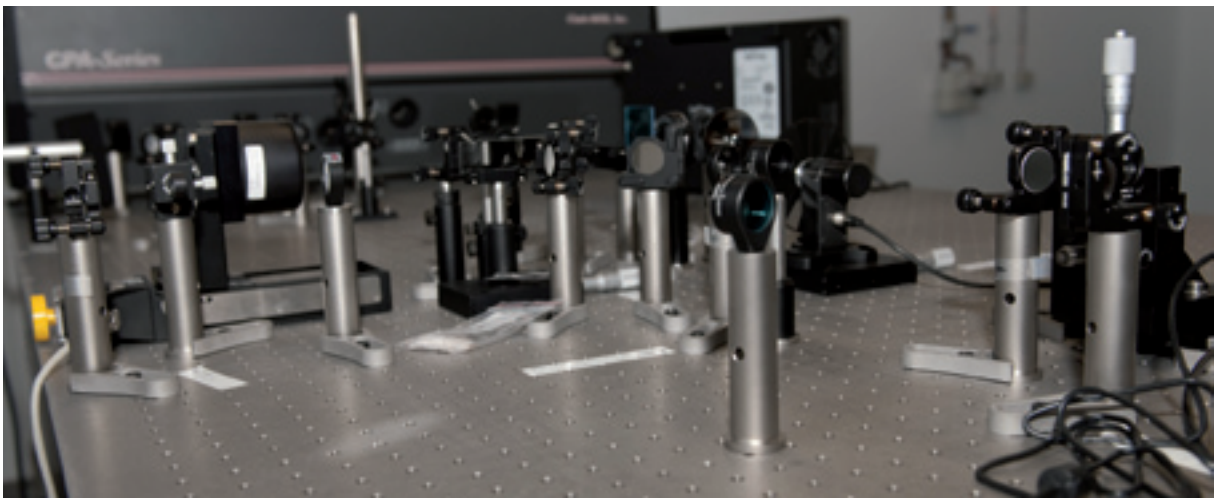
Figure 1: schematic representation of the MNP functionalities related to the theragnostic approach.

MAMA

"Unlocking research potential for multifunctional advanced materials and nanoscale phenomena"

Funding: FP7-REGPOT-2010-1 nº 264098
Partners: Consortium of 11 European partners coordinated by the CNR-SPIN, Italy
Duration: 2010 -2014
Principal Investigators: Dr. Rodolfo Miranda & Dr. Paolo Perna
http://mama.spin.cnr.it/

Multifunctional materials are defined as those materials that perform specific functions other than possessing a load bearing capacity. Examples include semiconductors, magnetic materials, piezoelectric and ionic conductors. In this context, transition metal oxides (TMOs) have been attracting an ever-increasing interest, due to the wide variety of physical properties that they exhibit, including unconventional superconductivity, piezo- and ferroelectricity, colossal magneto-resistance, multi-ferroicity and a number of exotic magnetic, charge and orbital orderings. Still, the analysis and modelling of hybrid heterostructures, where layers of functional organic materials represent an ultimate and even more ambitious challenge. Such features are believed to open the route to the fabrication of device prototypes where multiple functionalities of TMOs and functional organic layers are nano-integrated on the same chip. The range of application sectors is correspondingly large, including: information and communications technology, energy generation, storage and transport. Within the project the CNR-SPIN Campania aims at unlocking its research potential to face the scientific challenge behind the complexity of multifunctional advanced materials and nano-scale phenomena. By exploiting the available partnerships expertises and experimental endowment, complemented by the new resources provided within the project, the CNR-SPIN Campania aims at achieving the highest level of competitiveness about issues of i) materials fabrication, by addressing the growth of very high quality samples in the different shapes of epitaxial thin films and single crystals, also integrated together in complex hetero-structures and; ii) advanced material characterizations, both based on matter-light interaction, on scanning probe techniques and on electron-magnetic transport, iii) theoretical modelling and advanced multi-scale computation to analyze and get insight into different physical properties of innovative materials.



ONDA

"Ordered heteroand Nano-structures with Epitaxial Dielectrics for magnetic and electronics Applications"

Funding: FP7-PEOPLE-2009-IRSES nº 247518.
Partners: Consortium of 7 European partners coordinated by the University of Modena and Reggio Emilia (Italy) and IMDEA Nanociencia (Scientific coordination)
Duration: 2010-2014
Principal Investigators: Dr. Rodolfo Miranda & Dr. Julio Camarero

The objective of the project is to strengthen the research cooperation between EU and Russia in the strategic field of ultrathin nano-structured materials for advanced electronic applications through a program of exchange of researchers.

One of the goals of the project is the training of the exchanged researchers into experimental techniques and procedures that are commonly not applied at their parent institutions. For instance, early stage/young researchers, that are undertaking their professional formation, benefit of the exchange opportunity to expand their knowledge and to increase their opportunity of career development.

ONDA scientific activity regards the realization and study of ultrathin layered dielectric materials based on inorganic dielectrics (mainly fluorides on semiconductors), to promote the growth of suitable classes of materials, such as magnetically ordered hetero- and nanostructures or organic thin films for molecular electronics.

The IMDEA team, shares their expertise and skills in surface science and nanomagnetisms. We perform/train quasi-static and dynamic investigations of the magnetization reversal processes in the developed magnetic nanostructures. Both anisotropies and reversal mechanism are identified by using our home-made high resolution variable temperature vectorial magneto optic Kerr effect magnetometry set-up, with time, angular, temperature and vectorial resolution capabilities.

BIONANOTOOLS

"Protein design to generate bio-functional nanostructures"

Funding: FP7-PEOPLE-2009-IRG nº 246688
Duration: 2010-2014
Principal Investigators: Dr. Aitziber López-Cortajarena

The main objective of this is to understand how the structure and function of proteins are defined by their sequence and to apply learned rules to design new protein-based nanotools. In particular, focuses on a type of proteins called tetratricopeptide repeats

(TPR). They present a simple modular structure, where a small structural unit is repeated in tandem. Overall TPR domains are a very robust system to study protein structure, folding, and function, and to use them as building blocks for protein engineering to generate new functional nano-molecules.

We design functional proteins with defined binding-specificities and structural properties. These novel bio-tools will be extremely useful to monitor and investigate biological processes in vivo, as biosensors for diagnosis to detect disease biomarkers, and also as building blocks for applications in biomaterials design.

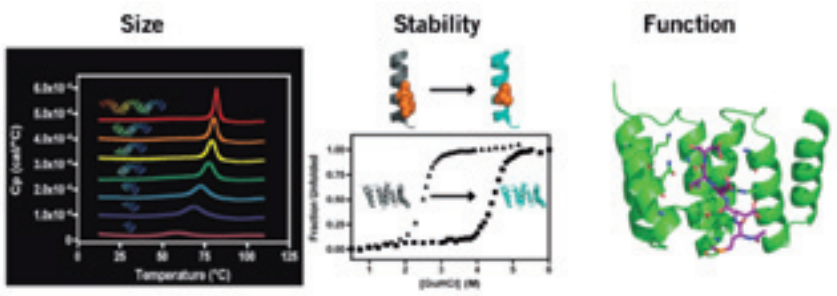


Fig 1. Bionanotools generation. Protein design for generation of tailored properties and modification of size, stability and function.

MRLSMO

"LSMO based magnetoresistive sensors"

Funding: CNRS Projet de coopération PICS 2012 France / Espagne N° Système: 157683
Duration: 2012-2014
Principal Investigator: Dr. Paolo Perna

The MRLSMO project is a cooperation project financed by the CNRS that focuses on the fabrication and characterization of half metallic perovskitic oxide La0.7Sr0.3MnO3 (LSMO) based magnetoresistive sensors. The project is established between the GREYC (CNRS-UMR 6072) laboratory and the Nanomagnetism's group at IMDEA Nanociencia Institute. With the aim of optimizing the magnetoresistive performances of the LSMO-based structures, we plan to investigate all the aspects concerning the fabrication of devices, i.e. thin film deposition and photolithography, structural characterization of materials, study of the magnetic properties (magnetic anisotropy), magnetoresistance and noise measurements.

The strength of the project relies on the multidisciplinarity of the partners in electrical engineering for GREYC and in nanomagnetism physics for IMDEA Nanociencia.

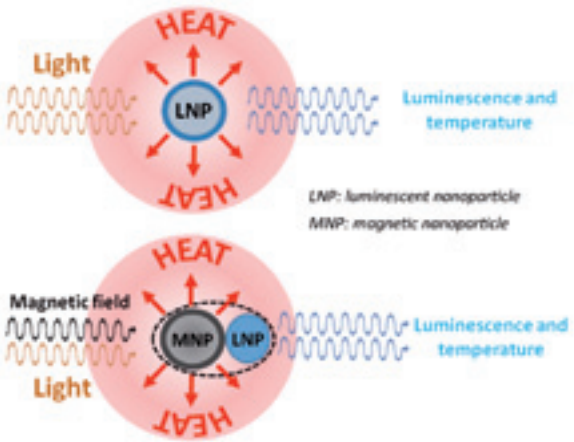
The two groups already demonstrated a strong scientific collaboration as demonstrated by several common publications on the investigation of the magnetization reversal processes, on the magnetic anisotropy and on the magnetoresistive response in this system.

3.5.2. National programmes

Multifunctional Nanostructuresfor Cancer Imaging and Controlled Thermotherapy

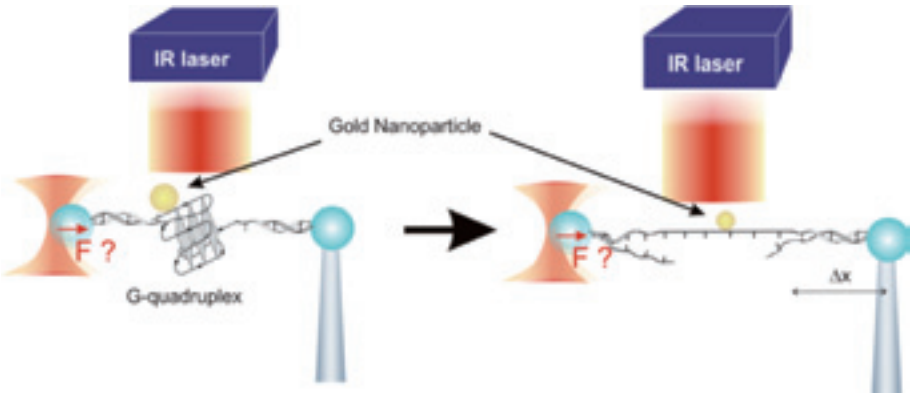
Funding: Ministerio de Economía y Competitividad. Programa Estatal de Investigación, Desarrollo e Innovación Orientada a los Retos de la Sociedad 2013. MAT2013-47395-C4-3-R
Duration: 2014-2017
IPs: Dr. Francisco Terán & Dr. Daniel Ortega

NANOTER is a multidisciplinary project aiming to develop novel multifunctional nanostructures for biomedical applications, mainly cancer therapy. NANOTER involves three research groups from UAM (coordinators), URV and iMdea, whose main goal is the synthesis and validation of novel nanostructures that combine: (i) remotely activated generation of local heat by IR light or AC magnetic fields, (ii) intratumoral temperature monitoring through luminescent probes, and (iii) medical imaging. It is precisely the combination of these features in a single platform where the originality of NANOTER lies upon. These multifunctional nanostructures are intended to increase the efficacy of thermal therapies against cancer by providing the means to control intratumoral heat exposure, which is one of the greatest challenges for using nanoparticle mediated hyperthermia in clinical settings.



G-quadruplex as a nanoheater-induced molecular switch demonstrated by optical tweezers

Funding: Ministerio de Economía y Competitividad. Programa Estatal de Fomento de la Investigación Científica y Técnica de Excelencia. Subprograma Estatal de Generación del Conocimiento. Proyectos "Explora Ciencia" 2013. MAT-49455-EXP
Duration: 2014-2015
IP: Dr. J. Ricardo Arias



Central assay in TweezQuadSwitch: *a G-quadruplex doped with a gold NP is illuminated in the infrared by a focused laser beam (left), exciting heat from the NP thus generating the mechanical unfolding of the nucleic acid structure (right) at a critical force F measured by the optical trap.*

G-quadruplexes are nucleic acid sequences rich in guanines (G) that form four-stranded structures. Control over the mechanics of folding and unfolding of the G-quadruplex structure has become an attractive goal in cancer research. There are several metallic complexes known to stabilize G-quaruplexes. They block the unfolding of the structure inhibiting the activity of telomerase.

We aim to use gold NPs as G-quadruplex folding/unfolding switches upon laser irradiation. We aim to demonstrate by using optical tweezers that we can control the conformation of a G-quadruplex by means of the heat released by a nanostructure. To test this prospect, we will attach a single gold NP to a (Pt-)G-quadruplex to attain a highly specific control on its folding state by using a laser beam. Then, we will use optical tweezers to hold a single G-quadruplex-NP construction to obtain a clear-cut detection of the folding/unfolding mechanical force signal.

Positive results will set the basis for the development of active nanoswitches that combine nucleic acids and absorptive NPs with unprecedented control by physical means. The proposed nanoactuators could be remotely controlled for therapeutic uses.

SUPERBIOL

Origin of life: generation prebiotic molecules in controlled chemical reactions on mineral surfaces

Funding: Ministerio de Economía y Competitividad. Programa Estatal de Fomento de la Investigación Científica y Técnica de Excelencia. Subprograma Estatal de Generación del Conocimiento. Proyectos "Explora Ciencia" 2013. MAT-49893-EXP
Duration: 2014-2015
IP: Dr. Miguel Ángel Niño

The sulfur-iron world is a hypothesis about the origin of life proposing that a pioneer organism, from which extant life was spawned, was generated from simple chemical reactions on the surfaces of iron sulfides mineral particles. Both these substrate particles and the reactive gases might have been produced in specific environments (such as thermal vents near volcanic craters). This project intends to analyse the feasibility of studying prebiotic chemical reactions by means of spectroscopic and desorption techniques; this approach allows analysing at the atomic scale, and under a broad range of pressures and temperatures, both intermediate adsorbed species and the products of the surmised prebiotic reactions. The central role of surfaces in this theory suggests that much could be gained by using the methodology and the techniques of Surface Science. This implies a radical departure from the experimental strategy used before (the conventional chemical reactors in which the surfaces were reacting in a liquid medium), using instead the methodology of research on heteregoneous catalysis.

PROBIOMAT

"Tailored protein biomaterials"

Funding: Ministerio de Economía y Competitividad. Subprograma de Proyectos de Investigación Fundamental No Orientada BIO. 2012-34835
Duration: 2013-2015
Principal Investigator: Dr. Aitziber López-Cortajarena.

The precise synthesis of materials with tailored properties it is a requisite for their use in nanotechnology and medicine. Bottom-up self-assembly that relies on molecular interactions of small defined components, is an attractive approach for biomaterial design and nanostructure templating.

In this project we use self-assembling proteins to generate templates for nanofabrication and biomaterials. We aim to rationally assemble biocompatible functional materials by the combination of simple protein building blocks with specified properties. In order to develop rational approaches for the design of complex nanostructures, we will define sequence-structure-assembly relationships for model designed repeat protein. We will then synthesize new protein molecules with unique assembly properties to generate higher order structures with desired properties and geometries.

This project is based on the deep molecular understanding of the components in order to combine them to generate nanostructures with defined properties.

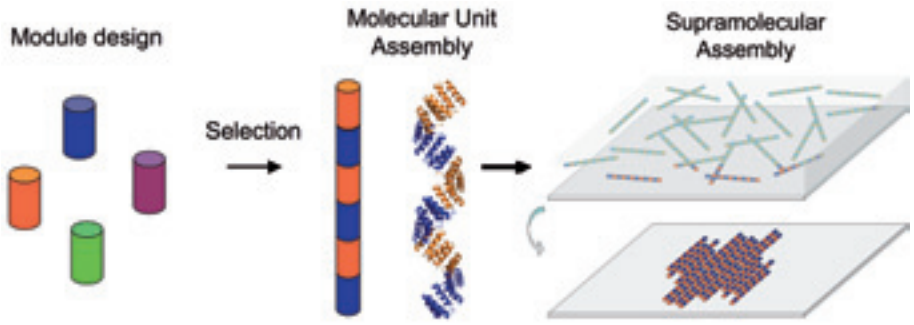


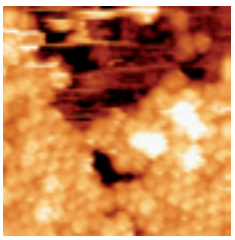
Fig 1. Schematic representation of bottom-up approach for engineering novel functional assemblies.

ColQDMol

"Colloidal Semiconducting Quantum Dot Molecules Studied by Scanning Tunneling Spectroscopy and Tunneling Current-Induced Luminescence"

Funding: Ministerio de Economía y Competitividad. Subprograma de Proyectos de Investigación Fundamental No Orientada FIS2012-33011
Duration: 2013-2015
Principal Investigator: Dr. Roberto Otero

The aim of this project is to fabricate molecules of colloidal semiconductor quantum dots (QDs) on graphitic surfaces, and the investigation of their electronic and optical properties with a Scanning Tunneling Microscope operated at cryogenic temperatures. Most of the previous studies on QD molecules have been carried out on epitaxially grown nanostructures. For these systems, the control over the possible geometries for the quantum dots is limited and they are very sensitive to atmospheric exposure. Colloidal QDs, on the contrary, are much more stable under ambient conditions, due to the surface passivation provided by the organic ligand shell, and their lateral position on a solid surface can be controlled very precisely by means of STM manipulations. While spectroscopy with the STM should give us information about the change of the electronic levels due to the presence of neighboring QDs, the optical coupling can be studied through the luminescence induced by the tunneling current.



STM image (41 nm x 41 nm, Vt = 3700 mV; It = 10 pA) showing a close-packed array of CdSe QDs on a HOPG surface

FASAMEX

"Friction at the Nanoscale: anisotropy effects and influence of mechanical excitations"

Funding: Ministerio de Economía y Competitividad. Subprograma de Proyectos de Investigación Fundamental No Orientada MAT2012-38810
Duration: 2013-2015
Principal Investigator: Dr. Enrico Gnecco

The main goal of this project was to study anisotropy effects in atomic-scale friction. The investigated surfaces included carbonate minerals, alkali halides, graphene and organic molecules self-assembled on crystal surfaces. An example is given in Fig. 1, where a friction map of CuPc molecules grown on dolomite is shown. Most of the experimental results could be reproduced using the Prandtl-Tomlinson model.

We have also performed nanomanipulation experiments to estimate the shear stress required to detach heteroepitaxially grown nanoislands (Fig. 2) and to relate the trajectories of nanoparticles to the friction force between particles and substrate (Fig. 3). The samples consisted in carbonate minerals and in metal or metalloids deposited on solid lubricants such as MoS2 and graphite.

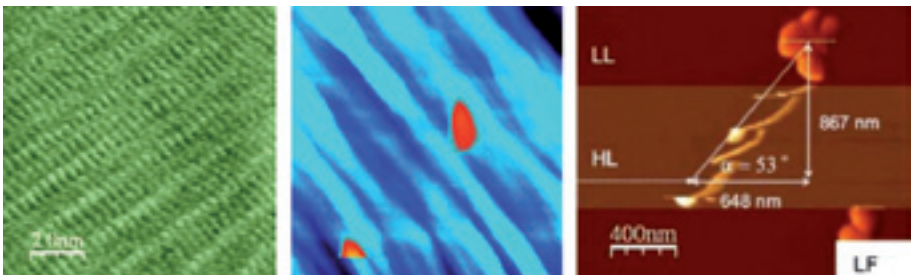


Fig. 1. Friction force map of CuPc molecules on dolomite (104) in water; Fig. 2. Detachment of a calcite island from a kutnahorite substrate; Fig. 3. AFM manipulation of Sb islands on a MoS_2 substrate.

The influence of mechanical vibrations on friction and the use of anisotropic substrates for nanomanipulation will be systematically explored in the continuation of this bridge project, which retains the same name.

DNA-COMPASS

"Super-resolution microscopy of DNA: optimization through correlative microscopy and spectroscopy"

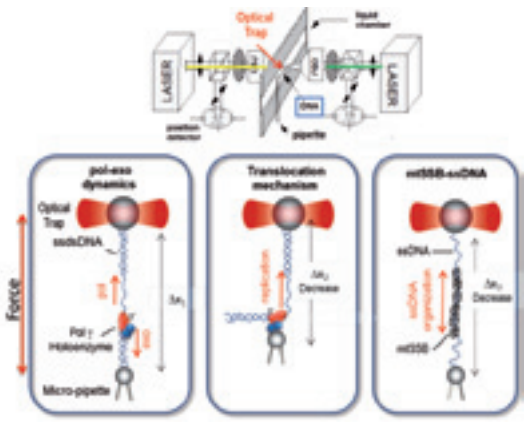
Funding: Ministerio de Economía y Competitividad. Subprograma de Proyectos de Investigación Fundamental No Orientada. MAT2012-34487
Duration: 2013-2015
Principal Investigator: Dr. Cristina Flors

This project will use two complementary tools to further develop super-resolution imaging of DNA. First, a novel correlative super-resolution fluorescence/atomic force microscope will be implemented. DNA nanostructures of controllable size and shape labelled with DNA-binding dyes will be used as test samples and imaged using the novel setup. The ability to correlate super-resolution and topography will be crucial to optimize the performance of the dyes, characterize undesired distortions of DNA structure, and identify possible super-resolution imaging artefacts. In addition, since the control of the photophysics of the dye/DNA complexes is crucial to improve the achievable spatial resolution, a combination of ensemble and single-molecule spectroscopic measurements will be used to study these complexes. This will allow us to understand important processes such as photoblinking. Finally, the improved protocols for super-resolution imaging will be used to study DNA nanostructure in cells.

DNAdyn

"Single molecule studies of the mitochondrial DNA repliciation dynamics"

Funding: Ministerio de Economía y Competitividad. Subprograma de Proyectos de Investigación Fundamental No Orientada. BFU2012-31825
Duration: 2013-2015
Principal Investigator: Dr. Borja Ibarra



Mitochondria are the energy-producing organelle in animals, and mitochondrial function impacts nearly every aspect of cellular function, being critical for life. A full understanding of the mitochodrial function is in need for an in-depth characterization of the mechanochemical processes that govern the operation of the molecular motors involved in the replication of the mitochondrial DNA. We propose to employ a combined approach of biochemistry, structural biology, and single molecule biophysics involving optical tweezers, to study the dynamical and mechanochemical principles responsible for the activity of the proteins involved in the replication of the human mitochondrial DNA. The long-term objective of our research is the elucidation of the mechanism of DNA replication in animal mitochondria, and its relationship to mitochondrial mutagenesis and human disease.

SIESPER

"Towards perpendicular spintronic devices: magnetization reversal processes in out-of-plane exchange biased nanostructures"

Funding: Ministerio de Economía y Competitividad. Subprograma de Proyectos de Investigación Fundamental No Orientada. MAT2011-25598.
Duration: 2012-2014
Principal Investigator: Dr. Alberto Bollero

Advances from Materials Science, Physics and Engineering have led to dramatic improvements in information technology applications (hard disks, magnetic memories, sensors,...). In particular, an important effort has been done along the last decades by scientific and industrial research groups to increase the magnetic memory storage density through further miniaturization of devices.

SIESPER focuses on the study of the magnetization reversal processes in continuous and nanostructured multilayers prepared by sputtering and by molecular beam epitaxy. This goes through a successful understanding of, among others, the relevance of the preparation conditions (deposition parameters, patterning process...) on the final microstructural and magnetic properties of the nanostructured films together with effects due to the physical reduced sizes of the nanostructures. These aspects are of fundamental importance in the final performance in practical technological applications such as sensors (read heads,).

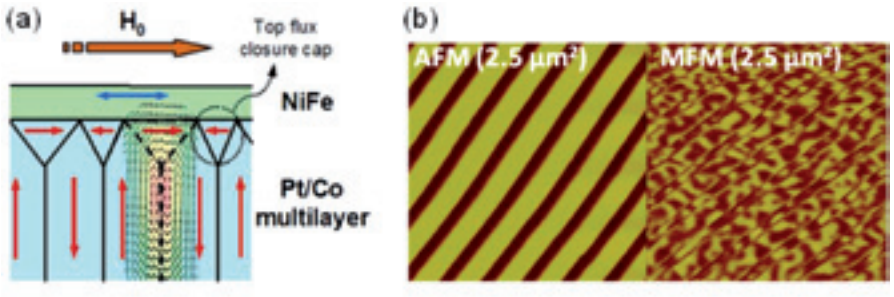
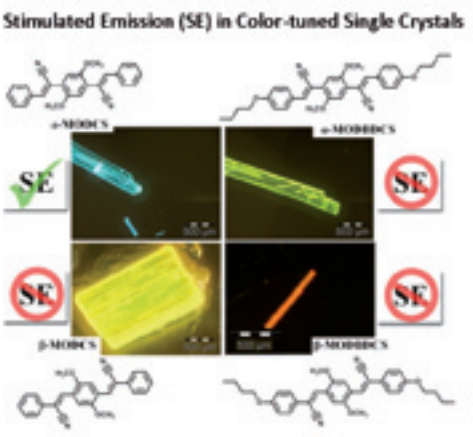


Figure. (a) Unequal closure domains configuration responsible of the phenomenon of exchange-bias observed in a ferromagnetic-ferromagnetic bilayer. (b) AFM (left) and MFM (right) images showing the topography and magnetic domain configuration, respectively, for nanostructures (lines) of the magnetic system shown in (a).

CONMOL

"Tailor-made Conjugated Molecular Materials via Intra- and Intermolecular Control"

Funding: Ministerio de Economía y Competitividad. Subprograma de Proyectos de Investigación Fundamental No Orientada. CTQ2011-27317.
Duration: 2012-2014
Principal Investigators: Dr. Johannes Gierschner (PI), Dr. Larry Lüer & Dr. Begoña Milián-Medina



The rational design of conjugated organic materials for optoelectronics with defined electronic, optical and photophysical properties in the solid state suffers from the complex interplay of intra- and intermolecular contributions, and from disorder usually found in polymeric samples. CONMOL thus explore structurally and electronically well-defined oligomeric materials forming single crystals. Experimental photophysical studies, hand-in-hand with advanced structural characterization and quantum-chemical calculations provide an in-depth understanding of solid state exciton signatures and their fate, and how this ultimately controls the emissive and multi-stimuli response in organic materials. This opens the path towards the design of supramolecular assemblies through specific secondary forces for bright emissive, color-tunable organic crystals, showing superior lasing, sensing, or charge transport properties.

SIMMA

Synthesis of Advanced Molecular Machinnery

Funding: Ministerio de Economía y Competitividad. Subprograma de Proyectos de Investigación Fundamental No Orientada. CTQ2011-25714.
Duration: 2012-2014
Principal Investigator: Dr. Emilio Pérez

We intend to investigate the possibility of synthesizing "molecular swimmers" molecules capable of moving directionally faster than diffusion. To do that, we have designed a series of designs based on the three linked spheres model, extensively investigated from the theoretical point of view. This system can be adapted to synthetically accessible targets based on lasso-type interlocked molecules. A second part of the project is dedicated to the synthesis of molecular machinery based on single wall carbon nanotubes. In particular we plan to synthesize rotaxanes based on SWNTs.

NANOMADRID

Know Science Today Opens the Future's Doors

Funding: FECYT. FCT-12-4221.
Duration: 2014-2015
IMDEA Nanociencia: Dr. Félix Zamora, Daniel Granados, Álvaro Somoza, Teresa González
www.nanomadrid.es

The aim of this project is to promote the transfer of scientific knowledge to the society. Particularly, we aim to engage high school students with science, since we believe that the current students are the future of the Spanish science. We plan to achieve our goals through dynamic workshops at the schools and high schools, where students can have a direct contact with current science. Our team is composed by several professors and researchers from different institutions around Madrid, which are participating in several events for the promotion of science at schools. We have prepared a website where the people interested can contact us to prepare a specific workshop at their schools.

Subprograma Estatal de Infraestructuras Científicas y Técnicas y de Equipamiento 2013

Funding: Ministerio de Economía y Competitividad. Programa Estatal de Fomento de la Investigación Científica y Técnica de Excelencia. FINA13-286
Duration: 2013-2015

Oficina de Proyectos Europeos MADRIMASD-IMDEA

Funding: Ministerio de Economía y Competitividad. Programa Estatal de Investigación, Desarrollo e Innovación Orientada a los Retos de la Sociedad 2013. Acciones de dinamización Europa Redes de Gestores. EUC2013-C-50806
Duration: 2014-2016
IMDEA Nanociencia as Participant

The project aims at strengthening the European Projects Office madrimasd-IMDEA, a network structure designed to support the participation of its members in European programs.

Science at the Nanoscale

Funding: Ministerio de Economía y Competitividad. Programa Estatal de Investigación, Desarrollo e Innovación Orientada a los Retos de la Sociedad 2013. Actuaciones de programación conjunta COFUND. COFUND2014-51539-03
Duration: 2014
IMDEA Nanociencia as Participant

The project is under the general frame of the Marie Curie action COFUND and the main goal is to co-fund Programmes for hiring researchers with transnational mobility, up to a maximun contribution of 40% of the programme cost. This proposal includes AMAROUT II Programme, granted to the Madrid Institutes for Advanced Studies network (IMDEAs), IMDEA Nanciencia among them, being IMDEA Software Institute the beneficiary.

3.5.3. Regional programmes

nano[front]mag-cm
nuevas fronteras del nanomagnetismo fundamental y aplicado

NANOFRONTMAG

Nuevas fronteras del nanomagnetismo fundamental y aplicado.

Funding: Programas de Actividades de I+ D entre grupos de investigación de la Comunidad de Madrid. Convocatoria TECNOLOGÍAS 2013. S2013/MIT-2850
Duration: 2014-2017
Principal Investigator. Prof. Rodolfo Miranda (UAM & IMDEA Nanociencia)
IMDEA Nanociencia IP: Dr. Aitziber López Cortajarena

NANOFRONTMAG-CM is a research project framed in the R&D activities program of the Community of Madrid, cofinanced by the European Social Fund, whose development takes place between 2014 and 2018.

The project, entitled “New Frontiers of Fundamental and Applied Nanomagnetism” is coordinated by Professor Rodolfo Miranda and integrates ten recognized research groups plus two laboratories from the Madrid Network in a joint Research Program with a scientific proposal comprising the fabrication, characterization and applications of both organic (single molecules, molecular films) and inorganic (nanowires, nanoparticles) magnetic nanostructures. The Consortium has more than 60 scientists in the academic groups plus companies (ITP, Tecnatom, Ingeniería Magnética Aplicada) and hospitals (HM Hospitales) involved in the objectives proposed.

The Program has a strong component in the development of instruments built on the tradition of the participating instititutions. Dr. Aitziber L. Cortajarena leads IMDEA Nanociencia group, and associated scientists Prof. José Luis Vicent, Prof. Nicolás Agraït, Prof. Fernando Martín and Prof. José L. Carrascosa lead some of the groups from UCM, UAM and CNB-CSIC.

PHOTOCARBON

Materiales avanzados de carbono para fotovoltaica molecular.

Funding: Programas de Actividades de I+ D entre grupos de investigación de la Comunidad de Madrid. Convocatoria TECNOLOGÍAS 2013. S2013/MIT-2841
Duration: 2014-2017
Principal Investigator. Prof. Nazario Martín (UCM & IMDEA Nanociencia)
IMDEA Nanociencia IP: Dr. Larry Luer

PHOTOCARBON is a research project entitled “Advanced carbon materials for molecular photovoltaics”. The project is framed in the R&D activities program of the Community of Madrid, cofinanced by the European Social Fund, whose development takes place between 2014 and 2018.

The aim of the project PHOTOCARBON is directed to the development of new advanced materials from different carbon nanoforms, namely fullerenes, endohedral fullerenes, fullerenes fragments, carbon nanotubes and graphene for their further study and use in the fabrication of organic photovoltaic devices. In this regard, in addition to the advanced characterization of these materials, their photophysical characterization in solution as well as in the solid state on the previously prepared devices.

The field of solar cells has undergone an outstanding progress outside of Spain and, specially in Europe. In this regard, our privileged geographical situation in terms of energy received from the Sun, should lead us to a higher development in this field in our country and in our Community of Madrid. The Program is coordinated by Prod. Nazario Martín and Dr. Larry Lüer leads IMDEA Nanociencia group.

MAD2D

Propiedades fundamentales y aplicaciones del grafeno y otros materiales bidimensionales.

Funding: Programas de Actividades de I+ D entre grupos de investigación de la Comunidad de Madrid. Convocatoria TECNOLOGÍAS 2013. S2013/MIT-3007
Duration: 2014-2017
Principal Investigator. Dr. Francisco Guinea (CSIC)
MDEA Nanociencia IPs: Dr. Enrico Gnecco, Dr. Daniel Granados, Dr. Reinhold Wannemacher

MAD2D is a research project framed in the R&D activities program of the Community of Madrid, cofinanced by the European Social Fund, whose development takes place between 2014 and 2018.

The properties of graphene and other bidimensional materials, with on the development of devices and the storage and generation of energy.

The objectives are: i) Fundamental properties of graphene and other bidimensional compounds, ii) Synthesis and growth methods, iii) Functionalization, and iv) Energy storage and generation processes.

The proposal is to be carried out by a team from five public institutions, CSIC, IMDEA Nanociencia, IMDEA Materiales, IMDEA Energía and Universidad Autónoma de Madrid, as well as research laboratories of the companies AIRBUS, REPSOL, BRUKER, Nanoinnova, Albufera and Airnova. The background of the teams involved range from basic research to applied development.

It is expected that the proposal will lead to advances in the understanding of the properties of graphene and other two dimensional compounds, and to developments of industrial interest in the design of sensors and in energy related applications.

3.5.4. Industrial Projects

Abengoa Research

ABENGOA RESEARCH

- **GRAPHINK:** Conductive Graphene Inks (2013-14)
- **NANO4WATER:** Desalinization Filters based in COF (2014 –2015)

HM Hospitals

- Assessment of new diagnosis and treatment tool for Glioblastoma Multiforme (GBM) with super paramagnetic multi functionalized nanoparticles. Supported by a donation from Roche (2013-14)

Repsol

- **SONAR:** Development of Repsol's Nanotechnology Roadmap (2014 – 2015)
- **FREENOX:** NOx Ferroelectric Catalysis Proof of Concept (2014 – 2015)

Aernnova and Deimos Space

- **PERIGEO:** Graphene based Atmospheric Reentry Thermal Shields (2012 - 2014)

Laboratorios Rubió

- **NEFROSENSE:** Renal Failure Predictor test based in RNA detection in Colaboration with Nefrology and Reserach Departments at Hospital Ramón y Cajal
  - Fase 1: Jun – Oct 2014
  - Fase 2: Nov 2014 to July 2015

3.6. Fellowships and Internships

3.6.1. Fellowships

7FP Marie Curie Action. Amarout II

Incoming Fellowships

Call 2014
Dr. Ana Pizarro
Dr. David Écija
Dr. Daniel Cano
Dr. Rubén Guerrero
Dr. Alberto Rodríguez Pulido
Dr. José Santos
Dr. Santanu Bhattacharyya

Call 2013
Dr. Daniel Ortega

Reintegration Fellowships

Call 2014
Dr. Agustín Molina

Call 2012
Dr. Isabel Rodríguez

Spanish Ministry of Science and Innovation

Ramon y Cajal Programme

Call 2013
Dr. David Écija, Dr. Luo Feng, Dr. Daniel Granados, Dr. Ana Pizarro

Call 2011
Dr. Cristina Flors, Dr. Begoña Sot, Dr. Francisco Terán

Call 2009
Dr. Juan Cabanillas Dr. Larry Luer

Call 2008
Dr. Teresa González

Juan de la Cierva Programme

Call 2011
Dr. Paolo Perna

Technical Support Specialist Programme

Call 2013
Rebeca Amaro

Call 2011
Dr. Santiago Casado

Spanish Ministry of Economy and Competitiveness

FPI Programme

Call 2013
Aitor Monserrate (until July 2014)

Spanish Ministry of Education

FPU Programme. Predoctoral Grant

Call 2013
Leyre de Juan

Call 2011
Macarena Calero

Basque Government

Department for Education, Language Policy and Culture o
PREDOC Programme. Predoctoral Grant

Call 2013
Sara Hernández

Chinese Scholarship Council

Call 2014
Guilin Liu. "Photophysical investigations on single organic heterojunction interfaces". Two years secondment PhD fellowship

Call 2012
Junqing Shi. "Supramolecular Nanostructured Multi-Chromophore Materials". Four years PhD fellowship

Call 2011
Longfei Wu."Organic position sensitive photodetectors". Four years PhD fellowship
Hauyu Feng. "Multilevel magnetic recording in bit patterned media for areal densities above 5 Terabit-per-square-inch" Four years PhD fellowship

3.6.2. Internships

Mr. Javier Conesa Egea

"*Electrical conductivity of copper-nucleobases molecules* Universidad Autónoma de Madrid. Supervisor. Dr. Félix Zamora

Ms Paloma Rodríguez Sevilla

Silica encapsulation of IONP". Universidad Autónoma de Madrid. Supervisor. Dr. Gorka Salas

Ms Beatriz Sánchez Canela

"*Nanoparticle patterning through protein self-assembly".* Universidad Autónoma de Madrid. Supervisor. Dr. Álvaro Somoza

Ms Ana Belén Latorre

""*Desarrollo de sensores de ácidos nucleicos utilizando nanopartículas de oro".* Universidad Autónoma de Madrid. Supervisor. Dr. Álvaro Somoza

Mr. Héctor Rodríguez Rodríguez

Optical response of optically trapped quantum dots" Universidad de la Laguna. Supervisor. Dra. Beatriz H. Juárez

Mr. David Romera García

"The characterization of biomolecular templated hybrid materials" Universidad Autónoma de Madrid. Supervisor. Dra. Aitziber López Cortajarena

Mr. Javier Rial Rodríguez

"Towards Rare Earth-Free Permanent Magnets" Universidad Autónoma de Madrid. Supervisor. Dr. Alberto Bollero

Ms Delphine Canion

Institute of Technology Bordeaux University, France. Supervisor. Dr. Emilio Pérez

ESO + Empresa Programme

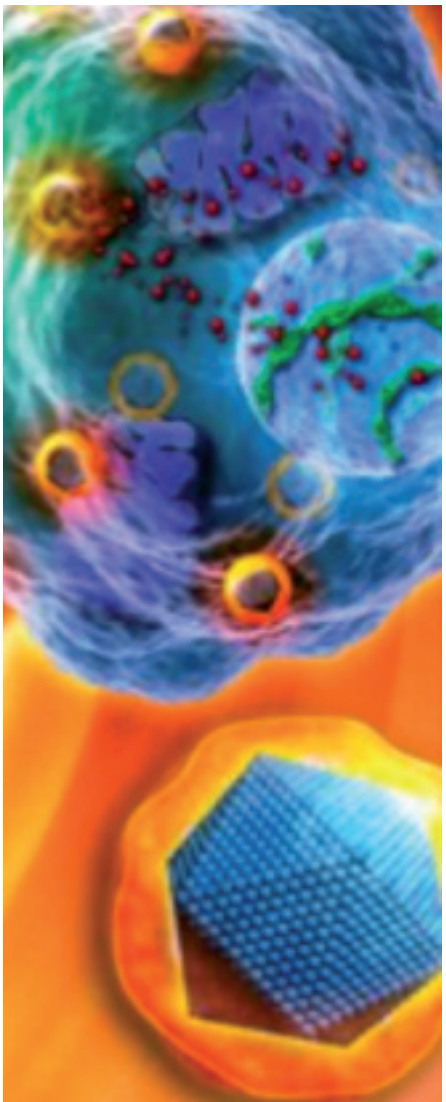
Comunidad de Madrid Programme for training stays of high school students in companies

Laura Alonso

(Colegio Alemán Madrid). 2 weeks in July 2014.
Supervisor Dr. F.J. Terán

Nicolo Stigliano and Henry Readwin

(King´s College Madrid). 24, 26 and 27 June 2014.
Supervisor Dr. Álvaro Somoza



3.7. Institutional Activities

13/ 01/2014

Inauguración de la sede del Instituto Madrileño de Estudios Avanzados en Nanociencia (IMDEA Nanociencia)

MEDIA

El País

Escarbando en lo más pequeño

RTVE

A la Carta

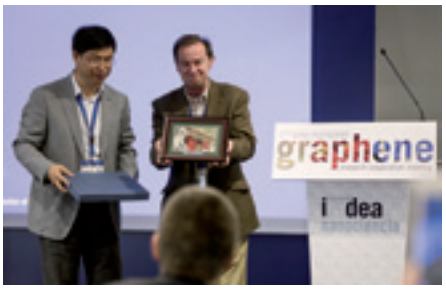
El Digital de Madrid

IMDEA Nanociencia

Telemadrid

12-13.05.2014

2nd Sino-European Graphene Research Cooperation Meeting, IMDEA Nanociencia, Madrid, Spain



MEDIA

Fundación Consejo España-China

9-11/04/2014

3rd Industrial Technologies exhibition, Athens, Greece

Project Stand

23-25/06/2014

The European Summit for Clinical Nanomedicine and Targeted Medicine (CLINAM 7/2014), Basel, Switzerland

Project Stand

15-16/10/2014

ETP Nanomedicine Annual Event San Sebastian, Spain

http://www.etp-nanomedicine.eu/public/press-documents/videochannel/nano-med

3.8. Academic Activities

3.8.1. Theses

28.04.2014

Mecanismos moleculares implicados en la infección del bacteriófago T7

Student: Verónica González
Supervisors: José L. Carrascosa and Ana Cuervo

28.04.2014

Organizing dimetal subunits: From structure to nanodevices

Student: Mohammad Reza Azani
Supervisors: Félix Zamora y Rubén Mas
Univesridad Autónoma de Madrid

15.06.2014

High harmonic generation from the H2+ molecular ion

Student: Azat Gubaydullin
Supervisors: Fernando Martín and Paula Rivière
Universidad Autónoma de Madrid

27.06.2014

Multimodal approach to the interaction of OD15 superparamagnetic nanoparticles and MCF-7 cancer cells

Student: Michele Chiappi
Supervisors: José L. Carrascosa and Javier Chichón
Univesridad Autónoma de Madrid

27.07.2014

Self-Assembly of molecules on nanostructured graphene

Student: Flavio Pendolino
Supervisor: Amadeo L. Vázquez de Parga
Universidad Autónoma de Madrid

26.09.2014

A systematic study on artificial graphene-based interfaces by means of Helium atom scattering & time of flight (HAS-TOF) and photoemission spectroscopy (XPS-UPS)

Student: Davide Maccariello
Supervisors: Daniel Fairas Tejerina y Julio Camarero de Diego
Universidad Autónoma de Madrid

16.12.2014

Efectos de confinamiento y proximidad en sistemas híbridos con diferentes interacciones de largo alcance

Student Luis Ruiz
Supervisor: J. L. Vicent
Universidad Complutense de Madrid

24.10.2014

Nuevos Sensibilizadores de Rutenio-Bipiridina para Células Solares Sensibilizadas por Colorante

María Sánchez
Supervisors: Tomás Torres and Purificación Vázquez
Universidad Autónoma de Madrid

11.12.2014

Thermopower and Conductance of Single-Molecule Junctions and Atomic Contacts

Student: Charalambos Evangeli
Supervisor: Nicolás Agrait

15.12.2014

Síntesis, propiedades y Aplicaciones de Derivados de Subftalocianina como Materiales Moleculares

Student: Julia Guilleme
Supervisors: Tomás Torres and David González Rodríguez
Universidad Autónoma de Madrid

2014

Synthesis and properties of [30]trithiadodecaaza-hexaphyrins

Student: Maksim Filatov
Supervisors: Mikhail K. Islyaikin and Tomás Torres Cebada
Ivanovo State University of Chemistry and Technology

3.8.2. Master Thesis

04.07.2014

Optical manipulation of non-canonical Nucleic acids structures

Student: Elisa Poyatos
Supervisors: J.R. Arias-González

16.07.2014

Síntesis y estudio de las propiedades de nanocristales de CdSe sometidos a procesos electroquímicos

Student: Julio José Conde
Supervisors: Beatriz H. Juárez y Concepción Alonso

13.09.2014

Nanostrcutured protein films and nanofibers functionalization

Student: David Romera
Supervisors: Aitziber L. Cortajarena

13.10.2014

Síntesis de nanopartículas semiconductoras aleadas coloidales y encapsulación de éstas en sílica preservando sus propiedades ópticas iniciales

Student: María Acebrón
Supervisor: Beatriz H. Juárez

13.10.2014

Caracterización a nivel de moléculas individuales de la actividad de apertura del ADN de la helicasa replicativa del fago T7

Student: Fernando Cerrón
Supervisors: Borja Ibarra & F. Javier Cao
Accesit 13th Arquímedes Univ. Contest 2014

3.9. Participation in Courses, Seminars and Conferences

15.01.2014

Institut Quimic de Sarria, Universitat Ramon Llull, Barcelona, Spain

Phthalocyanines: Old Dyes, New Molecular Materials
T. Torres

16.01.2014

Departament de Quimica de la Universitat Autónoma de Barcelona, Spain

Phthalocyanines: Old Dyes, New Molecular Materials
T. Torres

22/01/1423/01/14

Institut de Science des Materiaux de Mulhouse", IS2M - C.N.R.S. Mulhouse, France

- *Vibronic Coupling and Stimulated Emission in a Family of Conjugated*
- *Organic Crystals*
- *Ultrasonics for Nanomanipulation*
- *Acoustic Microscopy*
- *Some Questions of Nano-Optics*

27-31.01.2014

Applications,
IMDEA Nanociencia, Madrid, Spain

Excited States of Conjugated Organic Materials
J. Gierschner

Practical Aspects of Optical Spectroscopy: UV/Vis Absorption & Fluorescence
J. Gierschner

29.01.2014

Institut de Ciències Fotòniques (ICFO), Barcelona, Spain

New Directions in Nanoscale Imaging of DNA
C. Flors

02-06.02. 2014

XVI Escuela Nacional de Materiales Moleculares, Gandía, Spain

http://www.icmol.es/XVENMM/

Invited Specialized Seminars

Ftalocianinas y materiales moleculares
T. Torres

Fullerenos y Grafeno: Reactividad Química y Propiedades
N. Martín

Materiales orgánicos para la preparación de células solares fotovoltaicas
J. L. Delgado

2D materials based on Covalent Organic Frameworks-Polyimines
F. Zamora

Métodos Organocatalíticos en Química de Fullerenos
R. M. Girón

Nanopartículas magnéticas para hipertermia: motivación, fundamentos y caracterización
D. Cabrera

06.03.2014

Universidad de Barcelona, Barcelona, Spain

Interacciones supramoleculares cóncavo-convexo en nanoestructuras de carbono
N. Martín

14.03.2014

Department of Chemistry, University of Houston, Houston, Texas, USA

Phthalocyanines and Analogues as Components of Photovoltaic and Artificial Photosynthetic Devices
T. Torres

seminars, courses and conferences

20.03.2014
Chemistry Department, the University of Texas at Austin, USA

Phthalocyanines and Analogues as Components of Photovoltaic and Artificial Photosynthetic Devices
T. Torres

21.03.2014
Chemistry Department Louisiana State University (LSU), Baton Rouge, USA

Subphthalocyanines: Singular aromatic non-planar molecules
T. Torres

21.03.2014
Universidad del País Vasco, San Sebastián, Spain

Catálisis asimétrica sobre esferas de carbono: Síntesis de fullerenos quirales
N. Martín

24.03.2014
Imperial College London, London, UK

XUV/X-ray Femto- and Attosecond Laser Pulses for Ultrafast Electronic
F. Martín

26.03.2014
Facultad de Química, Universidad Nacional Autónoma de Mexico, Mexico

Phthalocyanines: Old Dyes, New Molecular Materials
T. Torres

30.03.03-04.2014
School of Photonics (organized by SIOF Società Italiana di Ottica e Fotonica), Cortona, Italy

Fluorescence Labelling for Super-resolution Microscopy
C. Flors

17.04.2014
Universite Paul Sabatier, Toulouse, France

XUV/X-ray Femto- and Attosecond Laser Pulses for Ultrafast Electronic Control in Chemistry
F. Martín

21.04.2014
Department of Chemistry, University of California Santa Barbara, California Nanosystems Institute, Santa Barbara, USA

Phthalocyanines and Subphthalocyanines as Components of Photovoltaic and Artificial Photosynthetic Systems
T. Torres

05.06.2014
Alexander von Humboldt Universität, Berlín, Germany

Concave-convex Supramolecular Interactions in Carbon Nanoforms
N. Martín

10.06.2014
Huazhong University of Science and Technology, Wuhsn, China

Nomagnets for Future Ultrahigh Density Magnetic Recording Media
Feng Luo

25.06.2014
CRG Core Facilities Technology Symposium: "Localization based super-resolution microscopy", Barcelona, Spain

Nanociencia: un reto actual (Conferencia inaugural)
N. Martín

Improving Super-resolution Microscopy with Correlative Imaging
C. Flors

09.07.2014

Curso de Verano, Universidad de Castilla y la Mancha. ¿Puede la Nanociencia cambiar nuestra vida?, Toledo, Spain

Nanopartículas funcionalizadas para el diagnóstico y tratamiento de cáncer
A. L. Cortajarena

09-11.07.2014

V Escuela de verano sobre Historia de la Química. Materia y radiación. Rayos-X y Cristalografía, Logroño, Spain

Nanociencia: una perspectiva histórica
N. Martín

18-29.08. 2014

Nano-Tribology 2014 PhD Summer School, Lyngby, Denmark

Atomic Force Microscopy
E. Gnecco

01-04.09. 2014

Curso de Verano UNIA, Simposio "Energía y medioambiente: tecnologías para un futuro sostenible", Baeza, Spain

Fotovoltaica Molecular. Células solares basadas en materiales orgánicos
T. Torres

12.09.2014

Department of Chemistry University of Coimbra, Portugal

Photophysics in Single- and Polycrystalline Organic Semiconductors
J. Gierschner

15.09.2014

Instituto de Física del Litoral, Santa Fe, Argentina

Adding Functionalities to Epitaxial Graphene by Self-assembly on or below its Surface
A. L. Vázquez de Parga

15.09.2014

ETH (Zurich, Switzerland)

Electron and nuclear dynamics in the photoionization of molecules
F. Martín

02.10.2014

Graduate School of Material Science, Nara Institute of Science and Technology (NAIST), Nara, Japan

Phthalocyanines and Phthalocyanine-carbon Nanostructures for Photovoltaic and Artificial Photosynthetic Devices
T. Torres

04.10.2014

Department of Chemistry, Graduate School of Science, Yoshida Campus, Kyoto University, Kyoto, Japan

Subphthalocyanines: Singular aromatic non-planar molecules
T. Torres

06.10.2014

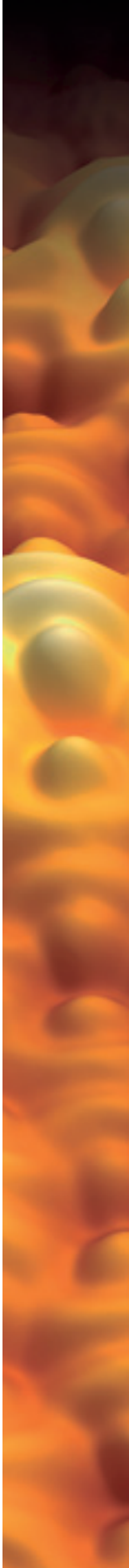
Institute for Integrated Cell-Material Sciences (iCeMS), Katsura Campus, Kyoto University, Kyoto, Japan

Phthalocyanines and Subphthalocyanines: Electro- and Photoactive Compounds for Molecular Photovoltaics
T. Torres

07.10.2014

Department of Material and Life Science, Graduate School of Engineering, Osaka University, Suita, Osaka, Japan

Subphthalocyanines: Supramolecular organization and self-assembling properties
T. Torres



08.10.2014

Laboratory of Nanotechnology, Instrumentation and Optics (LNIO), University of Technology of Troyes (UTT), France

Exciton Signatures and Fates in Conjugated Organic Materials: from Single Chains to Single- and Polycrystalline Materials
J. Gierschner

15.10.2014

2nd Congress of the Spanish Advanced Optical Microscopy Network (REMOA), Madrid, Spain

Fluorescence Labelling for Super-resolution Microscopy
C. Flors

16.10.2014

Instituto de Ciencia de los Materiales de Madrid, Madrid, Spain

Atomically Thin Semiconductors: Optoelectronics beyond Graphene
A. Castellanos-Gómez

22.10.2014

Faculty of Natural Sciences, University of Tübingen, Germany

Future Lighting
J. Gierschner

24.10.2014

Bayreuth Institute for Macromolecular Research, University of Bayreuth, Germany

Excitons in Highly Defined Conjugated Organic Materials: from Single Chains to Single Crystals (Tutorial)
J. Gierschner

26-30.10. 2014

7th European School on Molecular Nanoscience (ESMOLNA), Gandía, Spain

New Functionalities in 2D Materials
R. Miranda

Supramolecular Chemistry of Carbon Nanostructures
N. Martín

Atomically-thin 2d Crystals
N. Agrait

Subphthalocyanine-endohedral Fullerene Ensembles
T. Torres

Micro and Nanofabrication on 2D materials
D. Granados

Two-dimensional Optoelectronics: MoS2 and Beyond
A. Castellanos-Gómez

Role of Biological Matrix on Nanomagnetism of Iron Oxide Nanoparticle
F.J. Terán

Porphyrins for the Synthesis of Mechanically Interlocked Single-Wall Carbon Nanotubes
L. de Juan

Giant Spin-Orbit interaction in Graphene induced by intercalated Pb islands
J.J. Navarro

STM and XPS Characterization of Dy-Tetraazaporphyr in Double-Deckers in Metal Surface
J. Matarrubia

31.10.2014

Department of Chemistry, University of Jaen, Spain

Towards Organic Semiconductors by Design: A Joint Spectroscopic-Computational Approach on Highly Defined Systems (invited lecture in the cycle "Current Trends in Chemical Research")
J. Gierschner

07.11.2014
State Key Lab. Coordination Chemistry Nanjing University, Nanjing, China

Phthalocyanines and Related Systems as Components of Photovoltaic and Artificial Photosynthetic Systems
T. Torres

18.11.2014
Max Planck Institute Stuttgart, Stuttgart, Germany

Atomically Thin Semiconductors: Optoelectronics beyond Graphene
A. Castellanos-Gómez

13.11.2014
College of Chemistry, Sichuan University, Chengdu, China

Phthalocyanines and Related Systems as Components of Photovoltaic and Artificial Photosynthetic Systems
T. Torres

09.12.2014
Department of Materials Science and Engineering, Seoul National University, South Korea

Future Lighting: Chances & Challenges of OLEDs
J. Gierschner

Low Bandgap copolymers: MO and Excited State Design (invited)
J. Gierschner

09.12.2014
CERC Seminar Series, Ewha Womans University, Seoul, South Korea

Organic Single Crystal Lasers - a Materials View
J. Gierschner

13.11.2014
Mini-Symposium Honouring Prof. Javier de Mendoza on the Occasion of his Retirement, ICIQ-Auditorium, Tarragona, Spain

Subphthalocyanines: Singular aromatic non-planar molecules
T. Torres

17.12.2014
Facultad de Ciencias. Universidad del País Vasco (UPV/EHU), Leioa, Spain

Impact of the chaperonin CCT in α-Synuclein(A53T) amyloid fibrils assembly
B.Sot

honors

3.10. Honors

January 2014
Dr. Emilio Pérez
Miguel Catalán Award for Young Researchers 2013.

January 2014
Prof. Fernando Martín
Director of Professorship UAM-Fujitsu (Since January 2014)

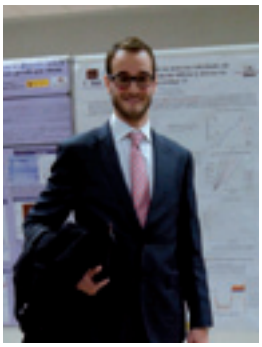
May 2014
Dr. J. Gierschner
Adjunct Professor at Seoul National University, Korea

June 2014
Prof. Nazario Martín
Catalán-Sabatier 2014 Award, from the Societé Chimique Française

September 2014
Dr. J. Gierschner
Visiting Professor at the University of Mons, Belgium

October 2014
Dr. J. Gierschner
Privatdozent at the Eberhard-Karl University of Tübingen, Germany

November 2014
Fernando Cerrón
Accesit in the 13th Arquímedes University Contest (2014) for introducing scientific research, organized by the Ministry of Education, Culture and Sport



3.11. Scientific Outreach Activities

3.11.1. Talks

24.01.2014
Attoquímica: filmando el movimiento de los electrones

Ateneo Científico y Literario de Madrid, Madrid, Spain
F. Martín

12.12.2014
Workshop on "Carrera Investigadora y Política Científica de la Comunitat Valenciana"

Universitat de Valencia, Spain
F. J. Terán

01.12.2014
The Nobel Prize in Chemistry 2014: what is a nanoscope?

Instituto de Ciencia de Materiales de Madrid, CSIC, Spain
C. Flors

12.12.2014
Un Vistazo al Nanomundo

Universidad de Valladolid, Valladolid, Spain
G. Salas

scientific outreach activities

3.11.2. Dissemination Articles

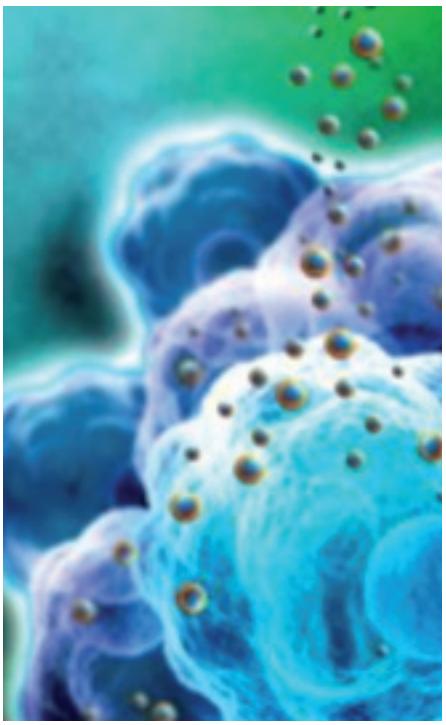
Nanomateriales a la carta
Beatriz H. Juárez y Luis M. Liz-Marzán *Investigación y Ciencia* 2014, nº 254

Interferómetro molecular suave
A. Palacios, A. González-Castrillo and F. Martín *Revista Española de Física* 28-2, 25 (2014)

Dinámica electrónica ultrarrápida en moléculas esenciales para la vida
F. Martín *Revista Española de Física* 28-4, 47-48 (2014) Press Note

Controlan la 'danza' de los electrones del helio
Press Note

Premio Nobel de Química 2014: el nanoscopio
C. Flors *An. Quím.* **110** (4), 2014, 284-285.



3.11.3. Media

IMDEA Nanociencia
YouTube Channel

11.04.2014
El Mundo (newspaper)

El libre albedrío de las moléculas y los átomos
J.R. Arias-González

02.07.2014
El Mundo (newspaper)

Si Newton hubiera sido un pez
J.R. Arias-González

16.10.2014
SINC, Agencia Nacional de Noticias Científicas

Observado el movimiento ultrarrápido de los electrones en una molécula vital
F. Martín

21.10.2014
Radio interview at Radio San Vicente

Observado el movimiento ultrarrápido de los electrones en una molécula vital
F. Martín

03.11.2014
You Tube Channel

Científicos observan dinámica electrónica ultrarrápida en molécula esencial
F. Martín

03.11.2014
Radio interview at Radio Exterior-RNE
in *Marca España*

Attociencia
F. Martín

03.11.2014
Radio interview at Radio Exterior-RNE
in *El Laboratorio de JAL*

Attociencia
F. Martín

05.11.2014
Cadena Ser (Radio) Programa
in *Hoy por Hoy Madrid*

Semana de la Ciencia
A. Somoza

24.11.2014
Radio interview at Radio Exterior-RNE
in *El Laboratorio de JAL*

Attosegundos para estudiar la vida
F. Martín

25.11.2014
Newsletter/website

Premio Nobel De Química 2014: de la Micros-copía a la Nanoscopía
C. Flors

18.12.2014
El Pais (newspaper)

Coreografía de un par de electrones
L. Argenti and F. Martín

19.12.2014
SINC, Agencia Nacional de Noticias Científicas

Controlan la 'danza' de los electrones del helio
F. Martín

3.11.4. Open Doors Activies

27/09/ 2014
La Noche de los Investigadores

"TU COCHE Y UN F1: CIENCIA Y TECNOLOGÍA DEL SIGLO XXI"

4, 7,11 & 14/ 11/2014
XIV Semana de la Ciencia

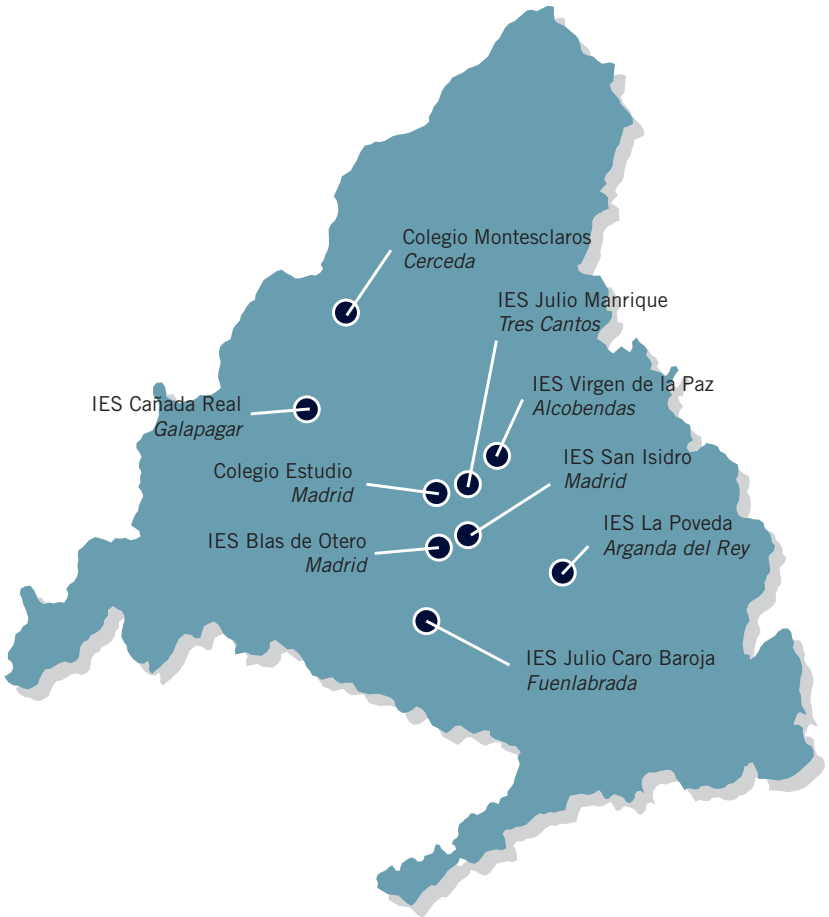
"ACERCATE A LA NANOCIENCIA. LO PEQUEÑO ES DIFERENTE: JORNADA DE PUERTAS ABIERTAS"

4, 7,11 & 14/ 11/ & 12/ 12/2014
ENTORNOS Programme

Centro Regional de Innovación y Formación del Profesorado "*Las Acacias*', Madrid, Spain
170 students (1º y 2º Bach) and 10 teachers from 5 IES have visited IMDEA Nanociencia

Nanociencia para todos

Nanociencia Para Todos is an outreach program developed in response to the demand for popular science activities from the citizens of Madrid, a demand that we noticed trough the overwhelming attention to our proposals in the Semana de la Ciencia de Madrid. We believe that one of our duties is to contribute to the creation of links between Science and Society in our region. *Nanociencia para Todos* is a monthly "Open Days" activity in which we receive mainly students from the last years of high school. In the first nine months of the program we received over **250** students, teachers and citizens.



Some of our activities:

Learn about IMDEA Nanociencia's microscopes

Do you know what SNOM, AFM, SEM or STM stands for? Did you know that they refer to different microscopes with which to explore matter with atomic resolution?

During the visit you will get to know what they are used for and how each of them works in very different conditions: from terrestrial environmental conditions to the ones similar to the conditions of interstellar space (ultra high vacuum and low temperature). IMDEA Nanociena researchers will tell you how they themselves manufacture some parts of some of the microscopes.

Nanostructure is key

Nanostructure is key to the development of next generation organic photovoltaic cells, and organic conjugated lenses for flexible or bright large screens which can be integrated for indoors or outdoors. It is also key in the biological activity of molecular motors and individual biomolecules, as well as surface wetting, and superhydrophobicity.

During the visit you will learn about how scale determines the properties of matter and how organic and inorganic matter behave similarly at the nanoscale.

Nanoparticles

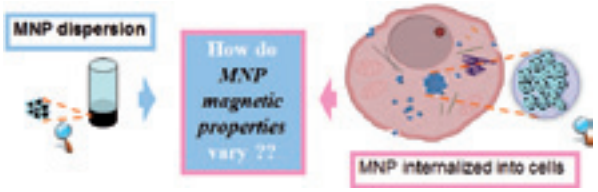
What are the properties of Gold nanoparticles or nanoclusters of gold and magnetic nanoparticles? What are their applications? IMDEA Nanosciencia researchers are working in the synthesis and functionalization of magnetic nanoparticles for use in the diagnosis and treatment of different types of cancer.

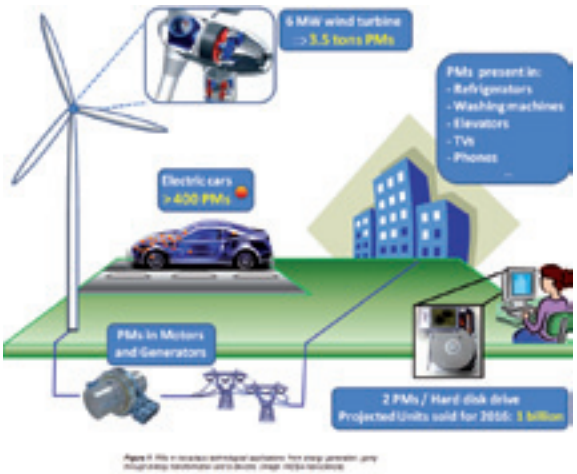
During the visit you will discover the properties of different types of nanoparticle and learn about the the magnetic properties of nanoparticles. What is the origin of the heating process and how is the heat generated is measured? What is the interest of using nanoparticles to treat cancer?

New Permanent Magnets

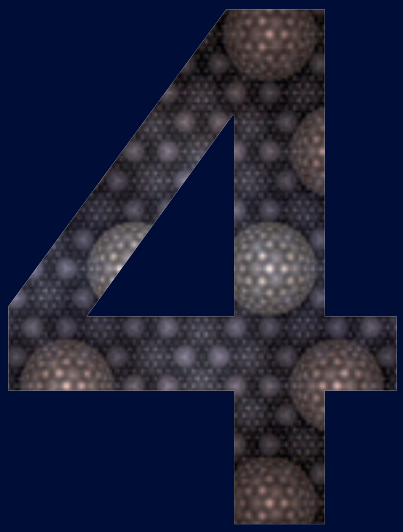
Magnetic materials are important in the production, transmission and use of electrical energy. It has become obvious over the years that an increased use of low carbon technologies is necessary to ensure a high living standard and to protect the environment. Permanent magnets (PMs), used in a multitude of technological applications, play a very important role in these efforts.

The New Permanent Magnets Lab at IMDEA Nanociencia aims at developing RE-free PMs as alternative to controversial Nd-Dy-Fe-B magnets. During the visit the Division of Permanent Magnets and Applications will show you how they are trying to achieve these goals and will tell you about the fundamental scientific issues they address as well as the social, economical and political implications of the PMs development.





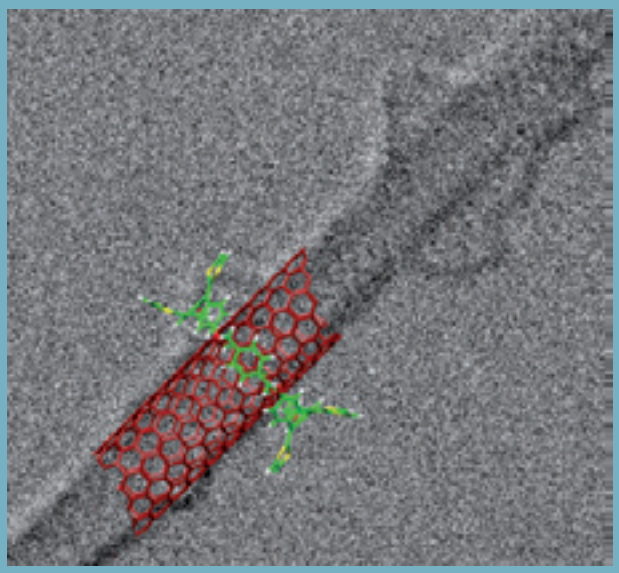
research focus



annual report 2014

emerging researche

Mechanically interlocked single-wall carbon nanotubes. de Juan, A., Pouillon, Y., Ruíz-González, L., Torres-Pardo, A., Casado, S., Martín, N., Rubio, Á. & Pérez, E. M. *Angew. Chem. Int. Ed.* (2014). **53** (21), 5394--400. (Doi: 10.1002/anie.201402258.)



Nanotubes in MINT condition! In a clipping reaction, macrocycles were formed by ring-closing metathesis around single-wall nanotubes (SWNTs) as "threads" to produce rotaxane-type species: mechanically interlocked derivatives of carbon nanotubes

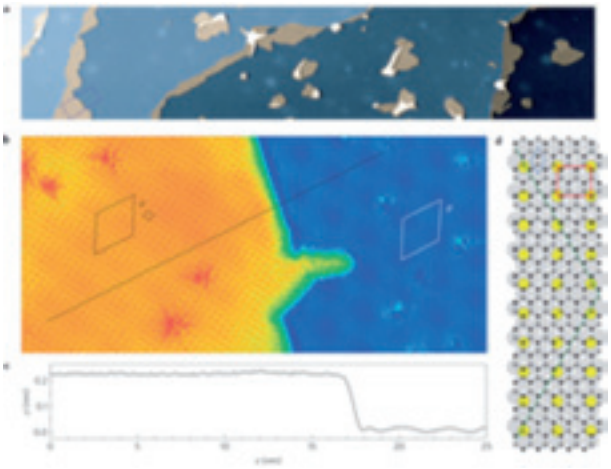
Making carbon nanotube rotaxanes

Single-walled carbon nanotubes (SWNT) are a promising base for organic electronics, but attempts to add components to the structures to gain additional functions can change the material's electronic properties by saturating desirable carbon-carbon double bonds. A team led by Emilio M. Perez of Madrid Institute for Advanced Studies in Nanoscience, in Spain, has developed a strategy for tying a macrocycle around a SWNT, like a ring on a very long finger.

The new rotaxane would permit useful components to be chemically attached to the macrocycle, thereby bringing them in the vicin ity of the nanotube's surface but without covalently altering it To design a linear precursor that would recognize a SWNT and cyclize into a macrocycle, the team began with two tetrathiafulvalene derivatives, which are known to associate with SWNTs. Then, by calculating the circumference around typical SWNTs, the team toggled the length of the linear precursor by adding alkene spacers. Finally, the linear precursor was cyclized through ring-closing metathesis. The chemists showed that the macrocycles don't change the electronic properties of the SWNTs and cannot be removed unless heated to 360 °C.

ers' highlights 2014

Spatial variation of a giant spin-orbit effect induces electron confinement in graphene on Pb islands. Calleja, F., Ochoa, H., Garnica, M., Barja, S., Navarro, J. J., Black, A., Otrokov, M. M., Chulkov, E. V., Arnau, A., Vázquez de Parga, A. L., Guinea, F. & Miranda, R. *Nature Physics* (2014). Published on line 15 December 2014. 43–47 (2015) (Doi: 10.1038/nphys3173.)



Large-scale STM image (470 × 90 nm2) of gr/Ir(111) after deposition of Pb at 800 K.

Graphene is considered the material of the future due to its extraordinary optical and electronic mechanical properties, especially because it conducts electrons very quickly. However, it does not have magnetic properties, and thus no method has been found to manipulate these electrons or any of their properties to use it in new magnetoelectronic devices.

IMDEA researchers may have come with the key to overcome this limitation. The secret is to intercalate atoms or Pb islands below the sea of hexagons of carbon that make up graphene. This produces an enormous interaction between two electron characteristics: their spin -- a small 'magnet' linked to their rotation -- and their orbit, the movement they follow around the nucleus. To obtain this effect, the scientists laid a layer of lead on another of graphene, in turn grown over an iridium crystal. In this configuration the lead forms 'islands' below the graphene and the electrons of this two-dimensional material behave as if in the presence of a colossal 80-tesla magnetic field, which facilitates the selective control of the flow of spins.

This result paves the way towards highly functional and scalable graphene electronic and spintronic devices.

nanomedicine for

Nanomedicine for the treatment of uveal melanoma

of uveal melanoma

"NUEVAS APROXIMACIONES PARA EL TRATAMIENTO Y DETECCION DE MELANOMA DE ÚVEA BASADAS EN NANOPARTÍCULAS DE ORO FUNCIONALIZADAS"

Dr. Álvaro Somoza Calatrava
69.000€ 3 years 2014-2017

One of the most significant applications of nanotechnology is on the detection and treatment of diseases. This area of research is known as nanomedicine and aims to overcome the limitations of the current approaches using different nanomaterials. In this regard, one of the projects currently developed within the Nanomedicine program at IMDEA Nanociencia is focused on Uveal Melanoma. This project has been funded by the *Asociación Española Contra el Cancer* and seeks novel strategies for the detection and treatment of this disease using gold nanoparticles and oligonucleotides as key elements, which are combined to obtain spherical nucleic acid nanoparticle conjugates.

Uveal Melanoma is one of most common tumors of intraocular malignancies. In 90% of the cases, UM is generated due to a single point mutation of GNAQ gene. Currently, the diagnosis of this disease is based on morphological changes of medium-large sized lesions, which are prone to be disseminated to other organs. What is more, the treatment of this metastatic tumor is for now ineffective. Therefore, the development of systems allowing an early detection and treatments of UMs could improve greatly the survival of the patients.

Gold nanoparticles have been proved excellent nanomaterials for biomedical applications thanks to their biocompatibility and ease of modification. Particularly, they can be loaded with different bioactive molecules and delivered to tumoral areas using specific targeting molecules, or used as sensors due to their unique optical properties.

Oligonucleotides have multiple applications in biomedicine; however they are mainly limited to in vitro assays, due to their poor stability and biodistibution *in vivo*, particularly RNA derivatives such as siRNAs. These nucleic acids are able to inhibit the expression of genes and we aim to treat Uveal Melanoma by suppressing those genes involved in the disease.

Spherical nucleic acid nanoparticle conjugates (densely oligonucleotide functionalized AuNPs), are nanostructures that present remarkable properties for biomedical applications such as high colloidal stability, biocompatibility, excellent cellular uptake and stability against nuclease degradation. These properties make them ideal systems to develop biosensors as well as delivery systems of drugs and nucleic acids.

FUNDACIÓN aecc
INVESTIGACIÓN CONTRA EL CÁNCER

Detection of Uveal Melanoma

The sensors of the disease will be based on spherical nucleic acid nanoparticles conjugates containing molecular beacons, which bear a fluorescent dye (Figure 1). The particle will be able to reach the cytoplasm and release the molecular beacons, which will interact with nucleic acids associated with the disease, such as mutated mRNA or microRNAs. Upon this interaction the fluorescence will be significantly increased allowing the detection of Uveal Melanoma.

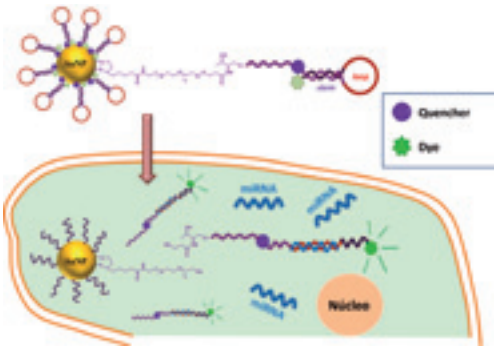


Figure 1. Detection of miRNAs using gold nanoparticles modified with molecular beacons.

Treatment of Uveal Melanoma

In the case of the treatment we will use spherical nucleic acid nanoparticles conjugates to deliver into the cells nucleic acids (siRNAs and microRNAs) that regulate the expression of genes involved in Uveal Melanoma (Figure 2). We will use chemical modifications developed by our group to improve the stability of nucleic acids and their activity.

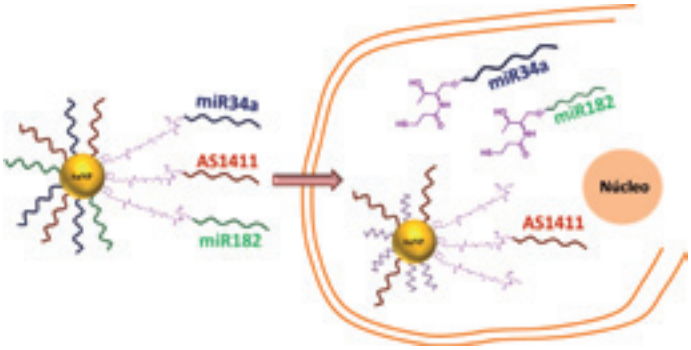


Figure2. Inhibition of microRNAs related with Uveal Melanoma using gold nanoparticles modified with nucleic acids.

industrial researc

Industrial Research Project: Nano4water

ABENGOA

A collaborative research project between IMDEA Nanociencia and Abengoa Research, led by Dr. Félix Zamora is focused on the search for novel materials with potential application for water treatment. The objective is the preparation of porous polymeric materials based on the selection of inexpensive and industrially available molecular precursors, using simple synthetic procedures, with the aim to facilitate industrial scale up. The materials consist of bidimensional polymers with structural order, known as covalent organic frameworks (COFs), these have cavities in the range of 0.5-5 nm that show large surface areas. They are pre-designed to enable capture of metal ions and/or molecules in their cavities, therefore allowing their potential use of water contaminants. The initial results are very promising for treatment of water, capture of contaminants and their detection. Two patents have already been presented for evaluation. Additional potential applications for gases separation and storage and as electrical energy storage technologies are currently under evaluation.

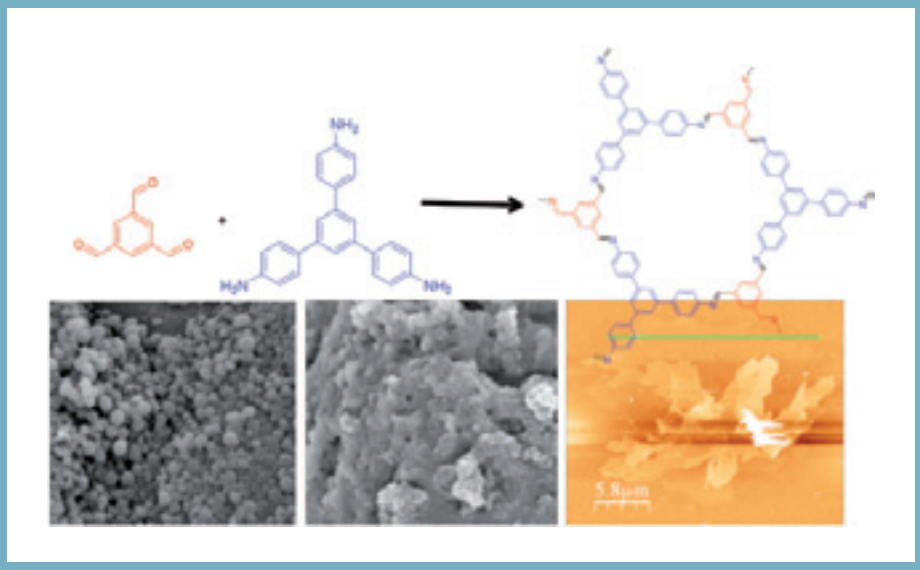


Figure 1: Schematic representation of a typical reaction to form a COF (top). Selected images of a COF showing different morphologies.

Industrial Innovation Project: Sonar

A joint team of more than 45 researchers from IMDEA and the Repsol Technology Research Centre are collaborating in the preparation of a strategic map of nanotechnology applications in the Energy sector. The result of this project, entitled SONAR (Strategic Opportunities of Nanotechnology Applications in Repsol), will allow the company to draw a roadmap identifying the most promising applications of nanotechnology research in the Oil & Gas industry, this project is a milestone in public-private collaborations. SONAR's aim is to define and implement a strategic framework to exploit the opportunities that nanotechnology can offer to Repsol, by outlining an internal roadmap.

The initiative is financed by Repsol and studies more than 65 technological challenges, grouped into 6 areas of application. For each of the challenges identified by the company IMDEA Nanoscience has proposed a series of nanotechnology solutions, more than 168 in total, which will be structured into a technology map on which research roadmaps will be plotted. Workshops organized to discuss the challenges and proposed solutions contained a multidisciplinary team of IMDEA Nanoscience, IMDEA Energy, and IMDEA Materials and researchers from Repsol. Already as a result of this collaboration, Repsol and IMDEA Nanoscience have initiated several research projects, the first of which focuses on reducing emissions and is already at the proof of concept phase (FRENOX).

Figure 1: The SONAR team of Repsol and IMDEA scientists.

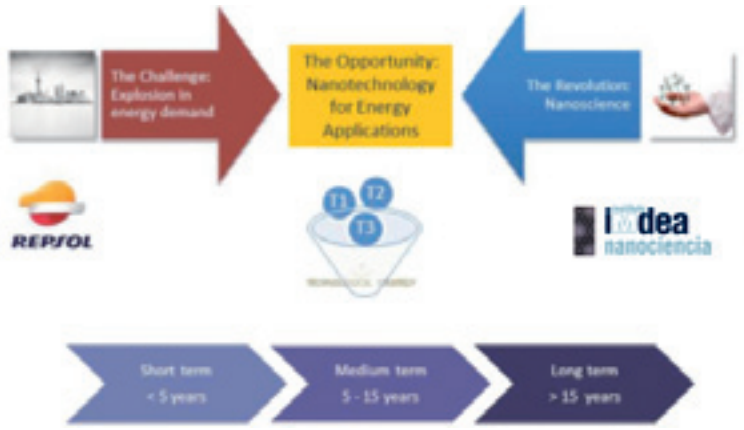
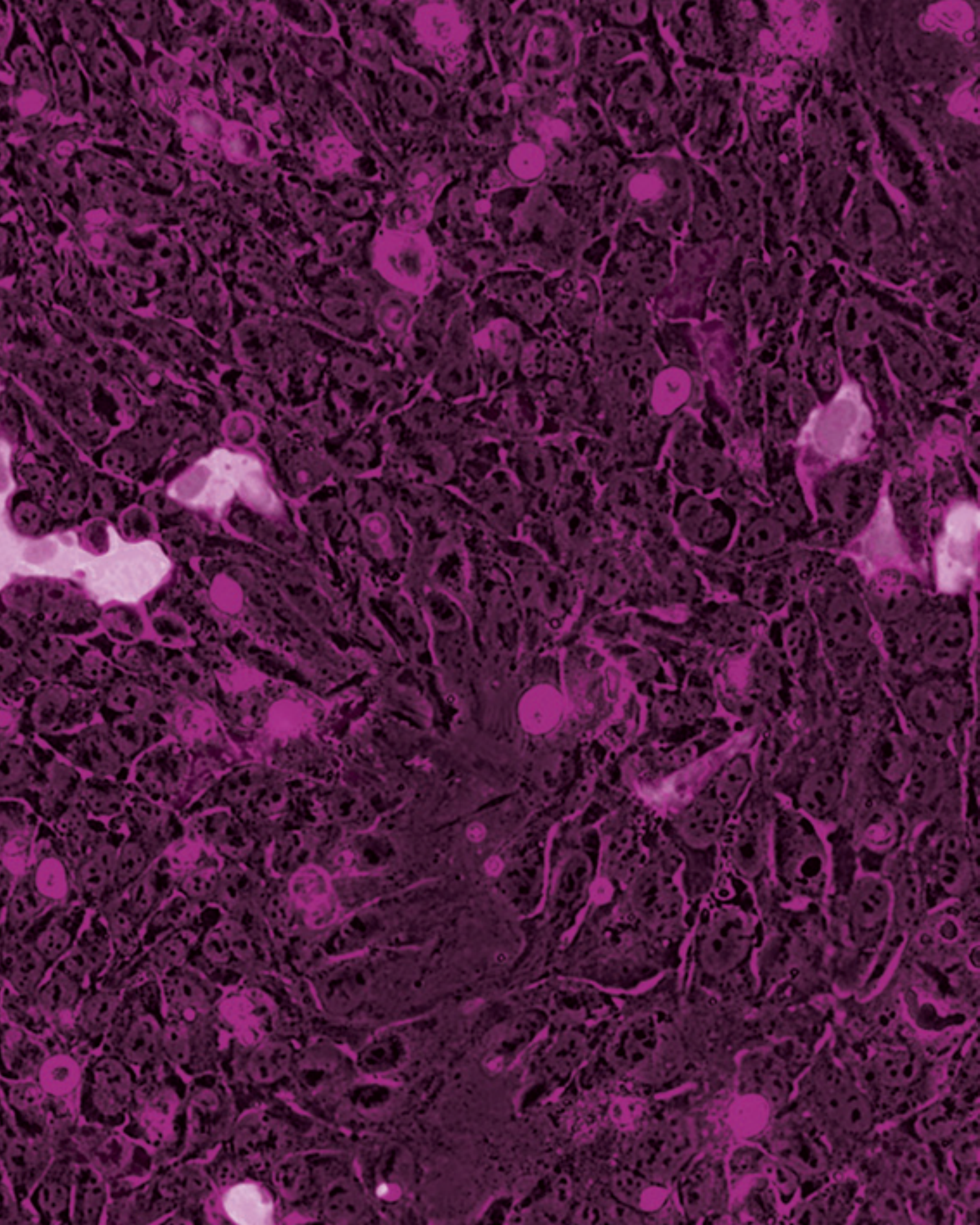


Figure 2: The Nanotechnology Roadmap -aligning nanotechnology solutions with strategic business challenges.



editor
imdea nanoscience institute

graphic design
base 12 diseño y comunicación

D.L.
M-10.915-2015