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annual report 2010

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annual report 2010

foreword

Rodolfo Miranda
Director, IMDEA Nanoscience Institute
april 2011

word

Thanks to the hard work and talent of everyone involved, IMDEA Nanociencia is approaching its fruition. 2010 has been an eventful (and successful) year for IMDEA. The achievements in its different tasks, from the organizations of labs to the scientific breakthroughs, from the motivation of the recruited personnel to the construction of the building, are countless.

I would like to acknowledge particularly the enthusiasm of IMDEA scientists and administrators alike. They are shaping a bright future for the Institute and for themselves.

The firm support of the Administrations involved, both regional and national, has to be recognized and appreciated in all its value in moments of crisis and doubts. Keeping among their priorities for 2010 the development of IMDEA Nanociencia, both Administrations light the way that might leads us to a better future as a region and as a country. We, the members of IMDEA Nanociencia, are fully compromised to try our best to give back to the Spanish society the privilege of the support that we have enjoyed. We did it well in 2010 and I believe that we will do it better in the years to come.

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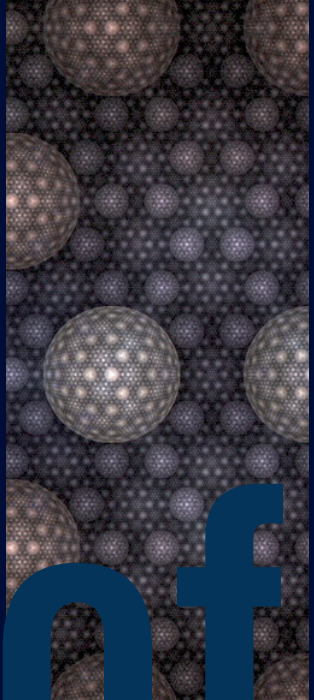

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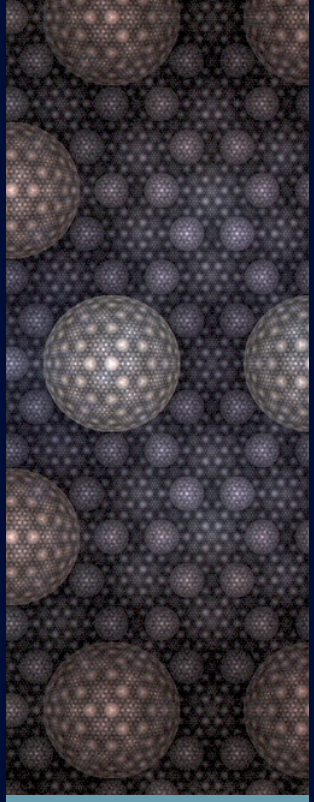


1 overview

1.1. Legal status

IMDEA Nanociencia is a private Foundation created by a joint initiative of the regional Government of Madrid (CM) and the Ministry of Science and Education, now Science and Innovation (MICIIN), of the Government of Spain.

The Foundation manages the Madrid Institute of Advanced Studies in Nanoscience, a new interdisciplinary research centre dedicated to the exploration of basic nanoscience and the applications of nanotechnology in connection with innovative industries.

An agreement was signed in February 2007 by both institutions to share the financial support of the Foundation with a long term commitment.

The Foundation is governed by a Board of Trustees, which contains representatives of the Administrations (CM and MICIIN), some relevant Academic Institutions (Universidades Complutense, Autónoma and Politécnica de Madrid, Consejo Superior de Investigaciones Científicas), industries, members of the Scientific Advisory Committee, and experts in societal implications of nanoscience and technology transfer.

1.2. Strategic Goals

- Attract new talent to Madrid/Spain in areas related to nanoscience and nanotechnology to improve the competiveness.
- Carry out research of excellence.
- Develop a new model of transfer of knowledge to the private sector based on its incorporation to the definition (and financial support) of medium-term, specific research lines.

1.3. Location

IMDEA Nanociencia has been located provisionally mostly in spaces from the Faculty of Sciences of the UAM and the Faculty of Chemistry of the UCM. The building of IMDEA Nanociencia is located at the Campus of the UAM in Cantoblanco, near Madrid. Given the interdisciplinary nature of research in Nanoscience, the location of the Institute in an environment characterized by its excellence in various related research areas will facilitate its success.

The foundation stone was laid on a public ceremony on January, 13th, 2010. The building is expected to be ready by the summer of 2011. It will have 8.200 m^2 of space for labs, offices and facilities such as the Center for Nanofabrication of the Campus of Inter-

national Excellence UAM+CSIC or the Center of Ultra-High Resolution Electron Microscopy.

Foundation stone ceremony on Janaury 2010.

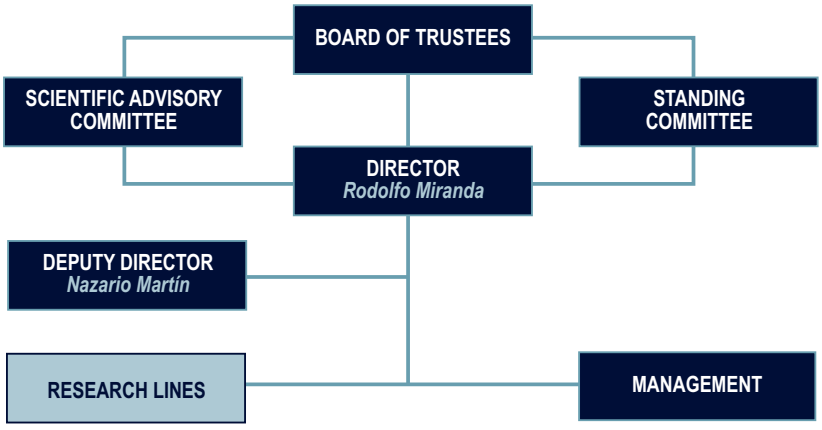
The new building of IMDEA Nanoscience will host approximately 100 senior and post-doctoral researchers from different areas, 20 laboratory technicians, 15 staff members for management and administration and the appropriate number of graduate students. The building is designed to have sufficient free space to ensure the rotation of research groups and the future incorporation of new programmes and areas. The Nanofabrication Center of the Campus of Excellence UAM+CSIC and the Center of Ultra-High Resolution Electron Microscopy. The building is expected to be operational in 2011.

New building of Imdea Nanoscience.

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 selects a group of candidates to be interviewed by the Direction. After the selection and negotiation process, the candidates are presented to the Board of Trustees and the corresponding offers presented to them. Postdocs and Ph. D. are also recruited on an internationally competitive basis, but selected directly by their corresponding supervisors from the staff. Researchers from different universities, the CSIC or other public institutions may also apply to 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.

1.5. Management Structure



1.6. Board of Trustees

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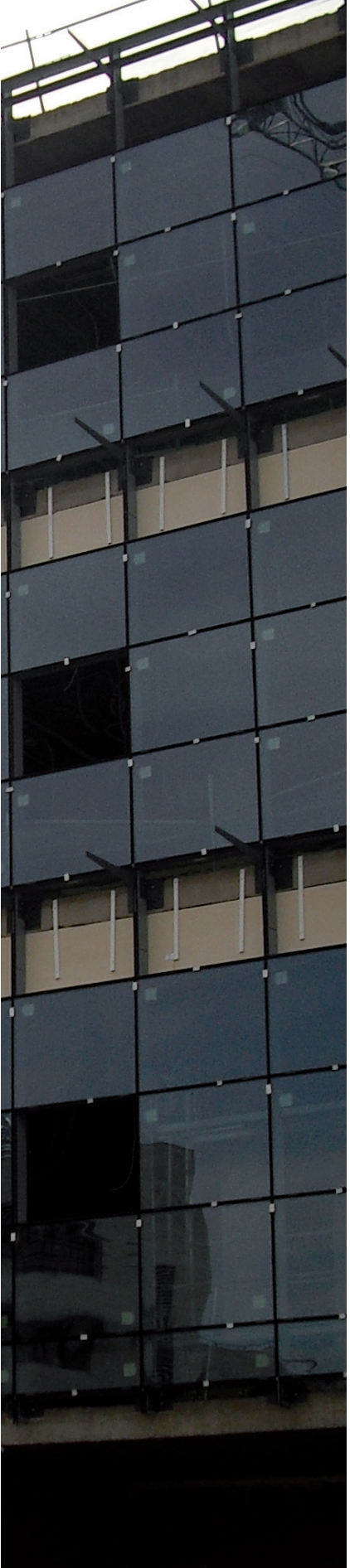

1.7. Scientific Advisory Committee

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

Prof. Luis Echegoyen
Director of the Division of Chemistry National Science Foundation (NSF). Department of Chemistry, Clemson University. USA

Prof. Andreas Engel
M.E. 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

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Dipartimento di Science Farmaceutiche. Universita di Trieste. Italy

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Director of Surface Science Research Centre. University of Liverpool. United Kingdom

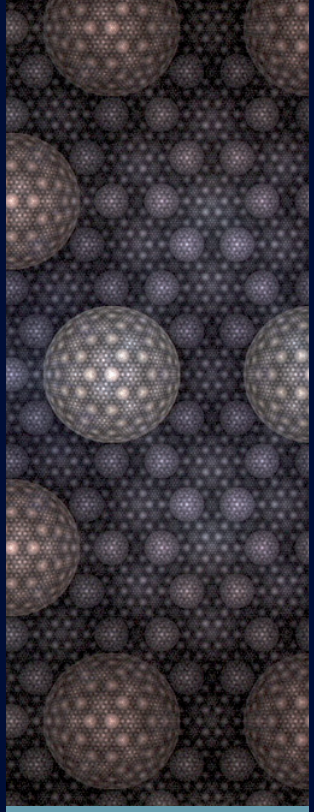
Prof. Miquel Salmerón
Director of the Materials Science Division. Lawrence Berkeley National Laboratory Adjunct Professor, Materials Science and Engineering Department University of California, Berkeley. USA

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

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

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

2 research programmes and scientists



Following the recommendations of the Scientific Advisory Committee, which were approved by the Board of Trustees of IMDEA-Nanociencia on the meeting of December 2007, the Institute has started 6 Research Programmes plus a horizontal Programme on nanofabrication. They have been selected on the basis of their interest and the existing capabilities (and limitations) to achieve international impact.

Programme 1
Molecular Nanoscience

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
Nanoacustics and Nanophotonics/ Nanooptics

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.

Prof. Nazario Martín León

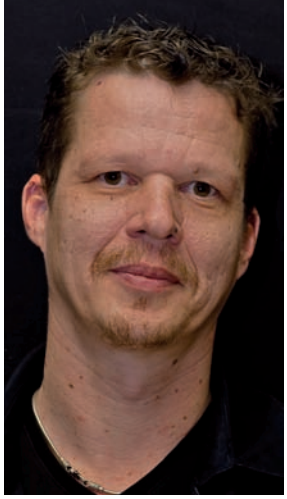
Programme Manager

Nazario Martín 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). Professor Martín's research interests span a range of targets with emphasis on the molecular and supramolecular chemistry of carbon nanostructures such as fullerenes and carbon nanotubes, p-conjugated systems as molecular wires, and electroactive molecules, in the context of electron transfer processes, photovoltaic applications and nanoscience. He has published over 380 papers in peer reviewed journals, given over 200 lectures in scientific meetings and research institutions, and supervised 22 theses. He has co-edited six books related with carbon nanostructures and he has been invited as guest editor for seven 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 is currently 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* (ACS) and *ChemSusChem* (Wiley-VCH). He is a member of the Royal Academy of Doctors of Spain as well as a fellow of The Royal Society of Chemistry. Since 2006, he is the President of the Spanish Royal Society of Chemistry and, more recently, he has been the recipient of the "Dupont Prize of Science" in 2007.

Relevant publications

- «Controlling the Transformation of Primary into Quaternary Structures: Towards Hierarchically Built-Up Twisted Fibers» Juan Luis López, Carmen Atienza, Wolfgang Seitz, Dirk M. Guldi, and Nazario Martín» *Angew. Chem. Int. Ed.* 2010, **49**, 9876–9880
- «Charge-transfer-induced structural rearrangements at both sides of organic/metal interfacesTzu-Chun Tseng, Christian Urban, Yang Wang, Roberto Otero, Steven L. Tait, Manuel Alcamí, David Ecija, Marta Trelka, José María Gallego, Nian Lin, Mitsuharu Konuma, Ulrich Starke, Alexei Nefedov, Alexander Langner, Christof Woll, María Ángeles Herranz, Fernando Martín, Nazario Martín, Klaus Kern and Rodolfo Miranda» *Nature Chemistry* **2**, *374-379,* 2010
- «A New exTTF-Crown Ether Platform To Associate Fullerenes: Cooperative n-π and π-π Effects Bruno Grimm, Jose´ Santos, Beatriz M. Illescas,Antonio Muñoz, Dirk M. Guldi, and Nazario Martín» *J. Am. Chem. Soc.* 2010, **132**, 17387–17389

Optical spectroscopy of polyconjugated materials



Prof. Johannes Gierschner

Senior researcher

Ph.D.: University of Tübingen, Germany

Previous Position: University of Tübingen, Germany

Johannes Gierschner received his PhD in 2000 in Tübingen (Germany), followed by a position as teacher, researcher, and institute manager. In 2004 he moved to Mons (Belgium) with D. Beljonne & J. Cornil, including a 4-month stay with J.-L. Brédas at Georgia Tech. Since 2008 he is Ramón y Cajal research fellow and Senior Researcher at IMDEA Nanoscience. He was visiting researcher in Valencia (2008-10) and holds regular visiting researcher positions in Tübingen and Seoul National University. JG has coordinated two European Marie Curie projects and has published more than 50 peer-reviewed papers (1200 cites, h = 18).

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 optical and photophysical properties of conjugated organic materials for optoelectronic applications, which he investigates in solution, supramolecular nanostructured host-guest compounds, thin films, suspended nanoparticles and single crystals.

Relevant publications.

- «Three-Dimensional Energy Transport in Highly Luminescent Host-Guest Crystals: A Quantitative Experimental and Theoretical Study» L. Poulsen *et col.* *J. Am. Chem. Soc.* 2007, **129**, 8585-8593
- «Optical Bandgaps of π-Conjugated Organic Materials at the Polymer Limit: Experiment and Theory» J. Gierschner *et col.* *Adv. Mater.* 2007, **19**, 173-191
- «Fluorescence and Absorption Spectra of Oligophenylenevinylenes: Vibronic Coupling, Band Shapes and Solvatochromism» J. Gierschner *et col.* *J. Chem. Phys.* **116**, 8596-8609 (2002)

Femtosecond spectroscopy on molecular systems

Prof. 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 conjugated 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.

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

- «Coherent Phonon Dynamics in Semiconducting Carbon Nanotubes: A Quantitative Study of Electron-Phonon Coupling" L. Lüer *et col.* *Phys. Rev. Lett.* **102**, 127401-4 (2009)
- "Size and Mobility of Excitons in (6, 5) Carbon Nanotubes" L. Lüer *et col.* *Nature Physics* **5**, 54 - 58 (2009)
- "Low Light Adaptation: Energy Transfer Processes in Different Types of Light Harvesting Complexes from *Rhodopseudomonas palustris*" V. Moulisova *et col.* *Biophys. J.* **97**(11), 3019 – 3028 (2009)

Hybrid systems based on semiconductor nanoparticles

Dr. Beatriz Hernández Juárez

Researcher

Ph.D.: Universidad Autónoma de Madrid, Spain

Previous Position: University of Hamburg. Germany

Beatriz Hernández is a researcher in the frame of 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

- "Ultrathin PbS Sheets by two dimensional oriented attachment" Constanze Schliehe *et col.* *Science* **329**, 550-553, 2010 (Front-Cover)
- "Quantum Dot Attachment and Morphology Control by Carbon Nanotubes" B. H. Juarez *et col.* *Nano Lett.*, 2007, **7** 3564–3568
- «High Energy Photonic Bandgap in Sb_2S_3 Inverse Opals by Sulfidation Processing» B. H. Juárez *et col.* *Adv. Mater.* 2002, **15**, 319-323

Leonor de la Cueva

Internship

Supramolecular chemistry and self-assembly of functional materials

Dr. Emilio Pérez Álvarez

Researcher

Ph.D.: University of Edinburgh, UK

Previous Position: Universidad Complutense de Madrid. Spain

Dr. Emilio M. Pérez obtained his BSc and MSc from the Universidad de Salamanca. He joined the group of Prof. David A. Leigh at the University of Edinburgh, where he obtained his PhD in 2005. He then carried out postdoctoral studies within the group of Prof. Nazario Martín at Universidad Complutense de Madrid. In December 2008 he joined IMDEA Nanoscience. He has received the 2006 IUPAC Prize for Young Chemists, the 2009 RSEQ Prize for Novel Researchers and the 2010 UCM Foundation Prize for Science and Technology. His main research interests concern supramolecular chemistry and the self-assembly of functional materials.

Research lines

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

Relevant publications

- "Self-Organization of Electroactive Materials: A Head-to-Tail Donor-Acceptor Supramolecular Polymer" G. Fernández *et col.* *Angew. Chem. Int. Ed.* 2008, ***47***, 1094-1097
- "exTTF as Building Block for Fullerene Receptors. Unexpected Solvent-Dependent Positive Homotropic Cooperativity" E M Pérez *et col.* *J. Am. Chem. Soc.* 2006, **128**, 7172-7173
- "Macroscopic Transport by Synthetic Molecular Machines" J Berná *et col.* *Nature Materials* **4**, 704-710 (2005)

Dr. David Canevet

Postdoc

CIMA Laboratory - University of Angers, France

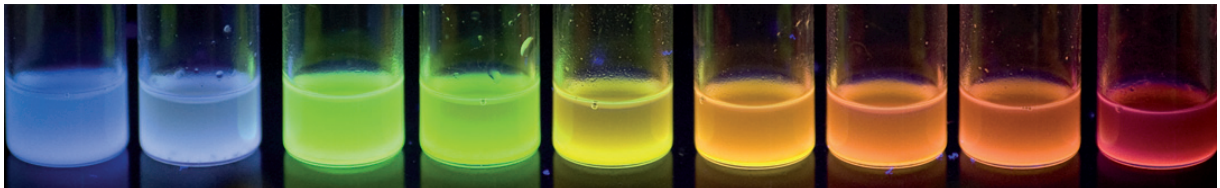
Dr. Fulvio Brunetti

Postdoc

University of California Santa Barbara, USA

Beatriz Isla

Ph.D. student



Design and synthesis of molecular nanostructures and nanomaterials

Dr. Juan Luis Delgado de la Cruz

Researcher

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

Previous Position: Universidad Complutense de Madrid. Spain

Juan Luis Delgado obtained his PhD in Chemistry (2004) from the Universidad de Castilla-la Mancha, with a work on materials for photovoltaic applications. He then joined the group of Prof. Jean-François Nierengarten, at the CNRS (Strasbourg and Toulouse, France) working on covalent and supramolecular fullerene chemistry and conjugated systems (2005-2006). Currently, he holds a "Ramón y Cajal" research contract at IMDEA-Nanociencia, where he is focused on the synthesis and design of new carbon-based energy storing materials for the development of more efficient organic photovoltaic devices. He is co-author of more than 50 papers and book chapters, and currently, he is the president of the group of Young Chemists Researchers of the Spanish Royal Society of Chemistry (RSEQ) http://www.rseq.org/jiq.htm.

Research lines

- Improvement of the performance of Bulk HeteroJunction (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$_1$-acceptor$_2$ systems, to study the electron transfer events that take place on these systems.

Relevant publications

- «Efficient Electron Transfer and Sensitizer Regeneration in Stable pi Extended 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 XJ *et col. Appl. Phys. Lett.*, **85**, 5081-5083 (2004)

Dr. Pierre-Antoine Bouit

Postdoc

Ecole Normal Superieur-Lyon, France

Carmen Villegas

Ph.D. student

Javier López

Internship

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 publications

- «*Photoinduced transient stark spectroscopy in organic semiconductors: a method for charge mobility determination in the picosecond regime*» , J. Cabanillas-González *et col. Phys. Rev. Lett.* **96**, 106601-10660 (2006)
- «*Exciton migration in beta-phase poly(9,9-dioctylfluorene)*» M. Ariu *et col. Phys. Rev.* B **67**, 195333-44 (2003)
- «*Energy transfer dynamics in polyfluorene-based polymer blends*», A. R. Buckley *et col. Chem. Phys. Lett.* **339** (2001) 331-336

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 Soriano

Programme Manager

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 supervised by 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".

Professor Miranda has authored and coauthored more than 220 scientific publications, which have received nearly 6.000 citations. He has supervised more than 40 Ph. Ds and postdoctoral researchers. Together with his collaborators, Prof. Miranda has developed instruments to perform Scanning Tunnelling Microscopy (STM), Helium Atom Scattering (HAS) or Angular Resolved Photoemission (ARUPS) in Ultra High Vacuum conditions. He has served on Advisory Committees for different institutions, such as the Surface Science Division of IUVSTA, the Max Planck Institute für Mikrostruktur Physik, Halle, or the European Synchrotron Radiation Facility (ESRF) at Grenoble. Prof. Miranda is Fellow of the American Physical Society, Head of the Surface Science Lab of the UAM (LASUAM) and Director of the Madrid Institute for Advanced Studies in Nanoscience (IMDEA-Nanociencia). He is Director of IMDEA-Nanociencia from February 2007.

Relevant publications

- "Determination of Surface Topography of Biological Specimens at high Resolution by Scanning Tunneling Microscopy". A.M. Baró, R. Miranda, J. Alamán, N. García, G. Binnig, H. Rohrer, Ch. Gerber and J.L. Carrascosa *Nature* **315**, 253-254 (l985)
- "Surfactant-induced Suppression of Twin Formation During Growth of fcc Co-Cu Superlattices on Cu(111)" J. Camarero, L. Spendeler, G. Schmidt, K. Heinz, J.J. de Miguel and R. Miranda *Phys. Rev. Lett.* **73**, 2448-2452 (1994)
- "Curie Temperature of Ultrathin Films of fcc-Cobalt Epitaxially Grown on Atomically Flat Cu(100) Surface". C.M. Schneider, P. Bressler, P. Schuster, J. Kirschner, J.J. de Miguel and R. Miranda *Phys. Rev. Lett.* **64**, 1059-1062 (1990)

Nanotribology

Prof. Enrico Gnecco

Senior Researcher

Ph.D.: University of Genova, Italy

Previous Position: University of Basel, Switzerland

Enrico Gnecco received his PhD in Physics from the University of Genova in 2001, and worked for almost 10 years at the University of Basel before moving to IMDEA Nanociencia. Among other topics, he investigated the frictional response of crystal surfaces in UHV, the onset of abrasion wear on the atomic scale, 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. Enrico Gnecco coauthored more than 50 peer-reviewed articles (h-index 14) and several book chapters.

Research Lines

At IMDEA Nanociencia Prof. Gnecco is responsible for research on nanotribology, i.e. the study of friction, adhesion and wear processes on the nanometer scale. His approach to this topic is both experimental (atomic force microscopy and related techniques) and theoretical (analytical models based on classical mechanics and reaction rate theory).

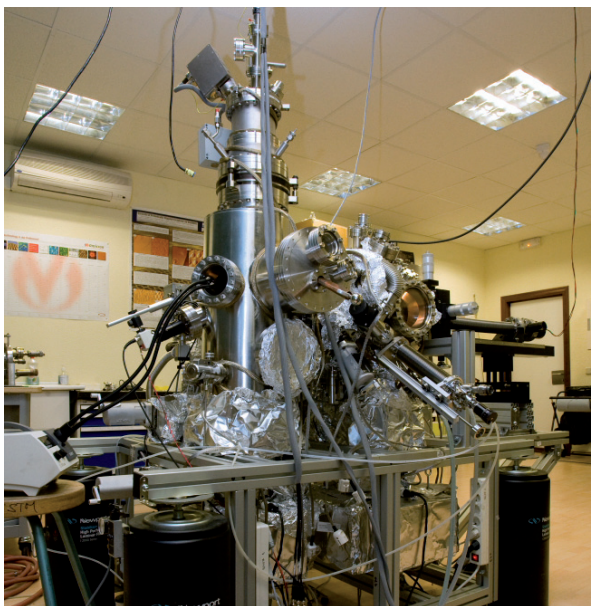
The ultimate goal of his work is to control friction and particle manipulation at the nanoscale.

Relevant Publications:

- "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 *et col. Science* **313** 207-210 (2006)
- «Velocity dependence of atomic friction» E. Gnecco *et col. Phys. Rev. Lett.* ***84***, 1172- 1175(2000)

Juan Manuel Benayas

Technician



Graphene growth and spectroscopy with low-T STM

Prof. A. L. Vázquez de Parga

Associated Senior Scientist

Ph.D.: Universidad Autónoma de Madrid, Spain

Previous Position: Universidad Autónoma de Madrid, Spain

Amadeo L. Vázquez de Parga got his PhD in 1992 at the Universidad Autonoma 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

- «Periodically rippled graphene: Growth and spatially resolved electronic structure» A.L. Vázquez de Parga *et col. Phys. Rev. Lett.* **100**, 056807-056811 (2008)
- «Atomistic mechanism of surfactant-assisted epitaxial growth» J. Camarero *et col. Phys. Rev. Lett.* **81**, 850-853 (1998)
- «Observation of preferred heights in Pb nanoislands: A quantum size effect» A.L. Vázquez de Parga *et col. Phys. Rev.* B **66**, 115401- 115406 (2002)

Dr. Antonio Politano

Postdoc

Universitá degli Studi della Calabria, Italy

Manuela Garnica

Ph. D. student

Sara Barja

Ph. D. student

Amjad Al Taleb

Internship

Modelling physical properties of nanostructures

Prof. Fernando Martín García

Associated Senior Scientist

Ph.D.: Universidad Autónoma de Madrid, Spain

Previous Position: Universidad Autónoma de Madrid, Spain

Fernando Martín graduated in Quantum Chemistry in 1984 and in Theoretical Physics in 1986 at the Universidad Autonoma 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".

Research Lines

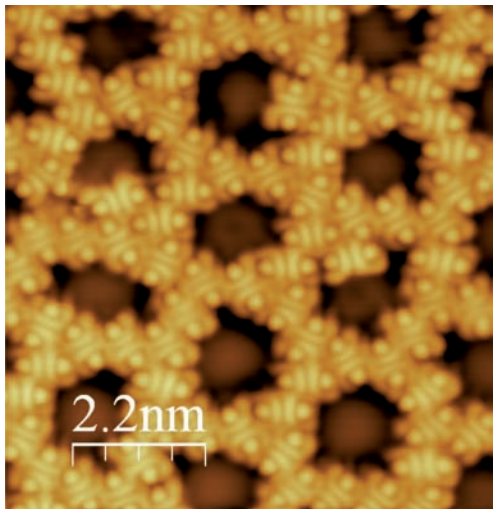
- Attophysics: Control of electron dynamics with ultrashort pulses and free electron lasers.
- Surface science: Molecular self-assembly and reactivity on metal surfaces and graphene.
- Nanoscience: Structure and properties of fullerenes and nanoparticles.

Relevant Publications

- "Electron localization following attosecond molecular photoionization" G. Sansone *et col.* *Nature* **465** 763- 766 (2010)
- "Single photon induced symmetry breaking of H_2 dissociation" F. Martín *et col.* *Science* **315**, 629-630 (2007)
- "Complete photo-induced breakup of the H_2 molecule as a probe of molecular electron correlation" W. Vanroose *et col.* *Science* **310**, 1787-1789 (2005)

Daniele Stradi

Ph. D. student



Atomic and molecular self-assembly at surfaces

Dr. Roberto Otero Martín

Associated Junior Scientist

Ph.D.: Universidad Autónoma de Madrid, Spain

Previous Position: 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 a Ramón & Cajal Associate Professor at Universidad Autónoma de Madrid and, since 2008, Associated Researcher 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

- "Elementary Structural Motifs in a Random Network of Cytosine Adsorbed on a Gold(111) Surface" Roberto Otero et. *col.* *Science* **319**, 312-315 (2008)
- "Guanine Quartet Networks Stabilized by Cooperative Hydrogen Bonds" Roberto Otero *et. col.* *Angew. Chem. Int. Ed.* 2005, **44**, 2270-2275
- "Lock-and-Key Effect on the Surface Diffusion of Large Organic Molecules Probed by STM" Roberto Otero *et. col.* *Nature Materials* **3**, 779-782 (2004)

Christian Urban

Ph. D. student

Fabiola Iacono

Ph. D. student

Jonathan Rodríguez

Ph. D. student

Marta Trelka

Ph. D. student

Pablo Nieto

Ph. D. student

programme 3
magnetism

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

Prof. Julio Camarero de Diego

Associated Senior Scientist
Ph.D.: Universidad Autónoma de Madrid, Spain
Previous Position: 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. He is currently Associate Professor of the Condensed Matter Physics Department and Secretary of the Institute of Materials Science "Nicolás Cabrera". In 2008 he joined the Nanomagnetism Group at IMDEA Nanoscience as Associated Senior Scientist.

He has published more than 60 regular papers (> 950 cites, *h*-index: 16), 9 book chapters, 4 invited papers, and 1 EU patent. 20 invited talks at international conferences (150 other conference presentations). Dr. Camarero is a frequently invited scientist in different Synchrotron Radiation Facilities (60 weeks).

Research Lines

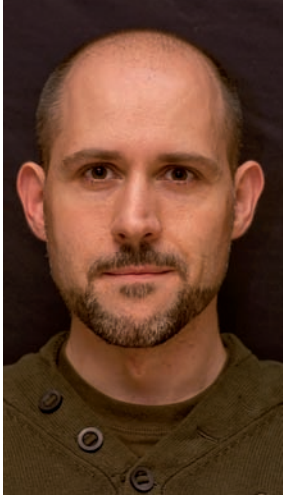
Currently, his goal is to acquire a better understanding of the fundamental physics of new functional properties that are important, or may become important, for applications in Spintronics and Biomedicine areas.

His main scientific interests are: development of new hybrid (inorganic-organic) magnetic nanostructures, magnetization reversal processes, polarization dependent x-ray spectroscopy and microscopy, sub-nanosecond and element resolved magnetization reversal dynamics, nanomagnetism and biomedicine.

Relevant Publications

- "Origin of the asymmetric magnetization reversal behavior in exchange-biased systems: Competing anisotropies" J. Camarero *et col.* *Phys. Rev. Lett.* **95**, 057204-057207 (2005)
- "Perpendicular interlayer coupling in FeNi/NiO/Co trilayers" J. Camarero *et col.* *Phys. Rev. Lett.* **91**, 02720-02724 (2003)
- "Surfactant-induced Suppression of Twin Formation During Growth of fcc Co-Cu Superlattices on Cu(111)". J. Camarero *et col.* *Phys. Rev. Lett.* **73**, 2448-2452 (1994)

Spintronics and biomedical applications



Dr. Alberto Bollero Real

Researcher

Ph.D.: Technical University of Dresden, Germany

Previous Position: CIEMAT, Spain

Alberto Bollero got a B.Sc degree from the *Universidad Complutense de Madrid*. He was a PhD student at the *IFW-Dresden,* working on nanocrystalline magnetic materials and got his PhD degree at the *Technical University of Dresden* in 2003. He has been Postdoctoral at the *University of Leipzig,* studying magnetic and magnetotransport properties of thin films, and Marie Curie Fellow at *SPINTEC (CEA-Grenoble)* on exchange bias systems for magnetic applications. Dr. Bollero was researcher at *CIEMAT-Madrid*: on photovoltaic applications and solar control coatings for architectural applications. Since 2010 he is "Ramón y Cajal" Fellow at *IMDEA-Nanociencia.*

Research lines

- Magnetic nanostructures for spintronics. Miniaturization of magnetic multilayered devices for technological applications in magnetic sensors based on spin valves and magnetic tunnel junctions. Magnetization reversal mechanisms and thermal stability.
- Magnetic nanoparticles with biomedical applications. Dynamic magnetic properties of nanoparticles for cancer therapeutic applications.

Relevant Publications

- *"Enhanced exchange bias effects in a nano-patterned system consisting of two perpendicularly-coupled ferromagnets",* A. Bollero *et col. Appl. Phys. Lett.* **92**, 022508-022510 (2008)
- *"Magnetoresistance switch-effect in a multiferroic Fe3O4/BaTiO3 bilayer",* M. Ziese *et col. Appl. Phys. Lett.* **88**, 212502-212504 (2006)
- "*Out-of-plane exchange bias properties of [Pt/Co]-IrMn bilayers sputtered on pre-patterned nanostructures"*A. Bollero *et col. Appl. Phys. Lett.* **89**, 152502-152504 (2006)

Dr. Nikolai Mikuszeit

Postdoc

Institute of Applied Physics, University of Hamburg, Germany

Erika Jiménez

Ph. D. student

Jose Luis Fernández

Ph. D. student

Cecilia Rodrigo

Ph. D. student

Growth & nanostructuring. magneto-electric thin films

Dr. Feng Luo

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 magnetio-electric 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-elastic-electric multifunctional thin film composites and hybrid ferromagnetic/organic interface of Molecular spintronics; Investigation of multifunctional magneto-electric 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**, 037205-037208 (2008)
- "Tuning the perpendicular magnetic anisotropy in tetragonally distorted $Fe_{1-x}Co_x$ alloy films on Rh (001) by varying the alloy composition" Feng Luo *et col. Appl. Phys. Lett.* **91**, 262512-262514 (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 (2004)

Dr. Paolo Perna

Postdoc

CNR-INFM CRS Coherentia, Naples, Italy

Davide Maccariello

Ph. D. student

Magnetic nanoparticles in biomedical applications

Dr. Francisco Terán Garcinuño

Researcher

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

Previous Position: Centro Tecnologico 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 has performed research studies on spin and electronic properties of semi-magnetic semiconductor nanostructures at different international research centers and joined the Nanomagnetism Programme of IMDEA Nanoscience on April 2009. Since then, Dr. Terán is interested on the dynamical magnetic properties of iron oxide nanoparticles for cancer treatments. Dr. Terán has more than 40 publications in international journals, and more than 35 communications at international congresses.

Research lines

- Magnetic and spin dependent phenomena in nanostructures
- Stimuli responsive polymeric surfaces
- Quantum Hall effect and related phenomena
- Spin dynamics in semimagnetic semiconductor nanostructures
- Optical properties of semiconductor nanostructures
- Electric transport and quantum tunnelling phenomena

Relevant Publications

- *"Collective character of spin excitations in a system of Mn^{2+} ions coupled to a two-dimensional electron gas"* F.J.Teran *et col. Phys. Rev. Lett.* **91**, 077201-077204 (2003)
- *"Dynamics of the localised spins interacting with two-dimensional elctron gas: Coexistence of mixed and pure modes"* M.Vladimirova *et col. Phys. Rev.* B **78**, 081305-081308 (R), (2008)
- *"g-factor dependence of the evolution of magneto-optical spectra with density of the quasi-two dimensional electrons in CdMnTe/CdMgTe heterostructures"* T.Wojtowicz *et. col. Phys. Rev.* B **59**, R10437- R10440 (1999)

Magnetic nanoparticles in biomedicine. Cell-particle interactions

Prof. Ángeles Villanueva Oroquieta

Associated Senior Scientist

Ph.D.: Universidad Autónoma de Madrid, Spain

Previous Position: Universidad Autónoma de Madrid, Spain

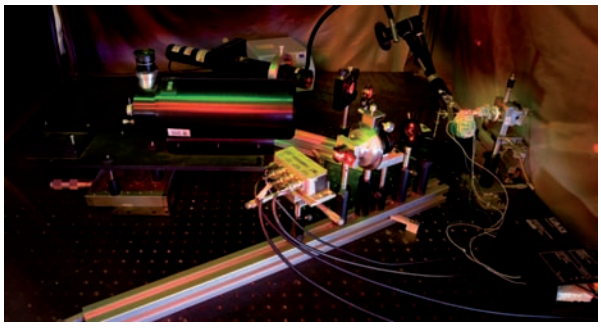
Dr. Ángeles Villanueva is a cell biologist. Her research is mainly focused on photodynamic therapy of cancer. In the last years, she has established new collaborations with research groups in the field of magnetic nanoparticles with applications in Medicine. She has studied in cell cultures: i) the mechanisms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

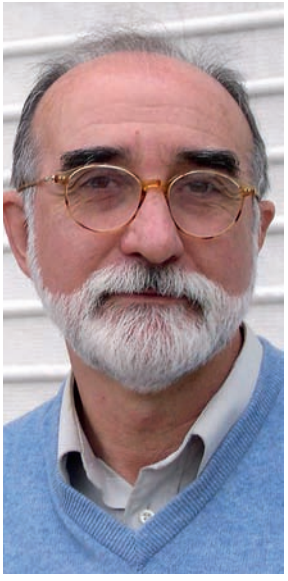
Relevant Publications

- *"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"* Rello S 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



programme 4
nanobiosystems: biomachines and manipulation of macromolecules

This programme includes several research lines which deal with the study of macromolecular complexes, their structure and functional properties, as well as their interaction with defined substrates to build synthetic tools. In the area of Single-molecule Analysis of Macromolecular Aggregates, there are groups working on AFM analysis of biological nanomachines, force spectroscopy analysis and manipulation of macromolecules and their aggregates, the study of nanomechanical properties of biological complexes of different complexities, and optical trapping-based approaches to study the behaviour of 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 Aggregates 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 with highly specialized functions and properties. Different groups of the Programme are collaborating with the Programme of Nanoacoustics of the Institute for the study of organic surfaces as potential substrates for macromolecular ordered interaction, and the incorporation of macromolecules and biological assemblies into metal nano particles as transporters.



Prof. José L. Carrascosa
Programme Manager

Prof. Carrascosa is Research Professor of the CSIC and Director of 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 near 200 publications with an H index of 40. 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 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

- The structure of CCT-Hsc70(NBD) suggests a mechanism for Hsp70 delivery of substrates to the chaperonin Cuellar, J., Martin-Benito, J., Scheres, SHW., Sousa, R., Moro, F., Lopez-Vinas, E., Gomez-Puertas, P., Muga A., Carrascosa, J.L., Valpuesta, J.M. *Nature Structural & Molecular Biology*, **15**, 858-864 (2008)
- Maturation of phage T7 involves structural modification of both shell and inner core components. X. Agirrezabala, J. Martín-Benito, J.R. Castón, R. Miranda, J.M. Valpuesta and J.L. Carrascosa *EMBO Journal* **24**, 3820-3829 (2005)
- «Cryo-Electron Tomography of Vaccinia Virus « M. Cyrklaff, C. Risco, J. J. Fernández, M. V. Jiménez, M. Estéban, W. Baumeister and J. L. Carrascosa *Proc. Natl. Acad. Sci. USA* **102**, 2772-2777 (2005)

Protein engineering and biofunctional nanostructures

Prof. 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 Dr. 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, with Dr. G.Haran working on single molecule spectroscopy. Then, continued her work at Yale University, as an Associate Research Scientist with Dr. Regan. She joined IMDEA Nanociencia as Group Leader in January 2010. Her research focuses on protein design toward the application of novel proteins in nanobiotechnology.

Research lines

- Design recognition protein modules as tools in nanobiotechnology
- Self-assembly of designed proteins into tailored nanostructures
- Synthesis, characterization of helical repeat proteins for silicon nitride nanopores translocation studies
- Polymer surface bio-functionalization for biosensors applications
- Magnetic nanoparticles bio-functionalization for cancer treatment and therapy

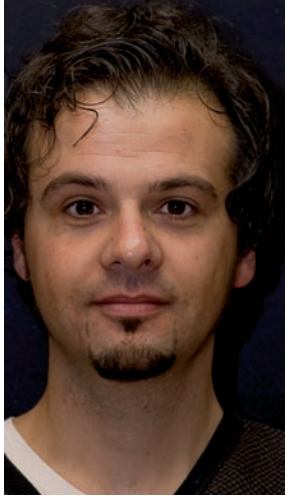
Relevant publications

- "Designed proteins as novel anti-cancer agents" Aitziber L. Cortajarena *et. col. ACS Chemical Biology* **3,** 161-166 (2008)
- Mapping the energy landscape of repeat proteins using NMR-detected hydrogen exchange" Aitziber L. Cortajarena *et. col. J. Mol. Biol.* **379**, 617-626 (2008)
- "Protein design to understand peptide ligand recognition by tetratricopeptide repeat proteins" Aitziber L. Cortajarena *et. col. Protein Engineering, Design & Selection* **17**, 399-409 (2004)

Alberto Sanz

Internship

Optical nanomanipulation in molecular and cell biophysics



Dr. Ricardo Arias-González de la Aleja

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 research purposes.

Relevant publications

- "Exploring mechanochemical processes in the cell with optical tweezers". S. Hormeño and J.R. Arias-González *Biology of the Cell* **98**, 679-695.S. (2006)
- "Single-molecule spontaneous emission close to absorbing nanostructures" J.R. Arias-González *et col. Appl. Phys. Lett.*, **85**, 3863-3865 (2004)
- "Optical forces on small particles: attractive and repulsive nature and plasmon resonance conditions" J.R. Arias-González and M. Nieto-Vesperinas *J. Opt. Soc. Am. A* **20,** 1201-1209 (2003)

Dr. Elías Herrero

Postdoc

Universidad Complutense de Madrid, Spain

Silvia Hormeño

Ph.D. student

Adriana Martín de Aguilera

Ph.D. student

Modified oligonucleotides in nanobiomedicine: RNA interference and sensors

Dr. Álvaro Somoza Calatrava

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 2008.

Research Lines

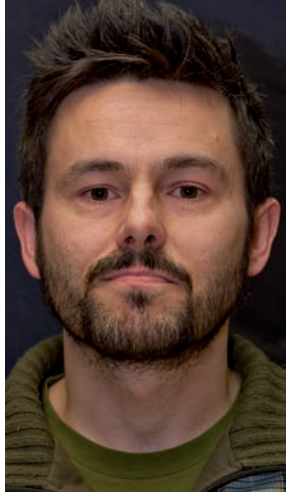
The research of Dr. Somoza is focused on the preparation of modified oligonucleotides for different applications. Particularly, modified RNAs are prepared to study the interactions with AGO proteins in RNA interference. These modifications are also evaluated aiming to improve the properties of siRNAs in gene inhibition.

In addition, oligonucleotides are used to assemble nanostructures for different applications such as sensors

Relevant Publications

- "Protecting groups for RNA synthesis: an increasing need for selective preparative methods" Somoza, A. *Chem. Soc. Rev.* **37**, 2668-2675 (2008)
- "Steric effects in RNA interference: probing the influence of nucleobase size and shape" Somoza A. *et col. Chemistry Eur. J.* **14**, 7978-7987 (2008)
- "The Roles of Hydrogen Bonding and Sterics in RNA Interference Somoza, A. *et col. Angew. Chem. Int. Ed.* **45**, 4994-4997 (2006)

Optical and magnetic tweezers



Dr. Borja Ibarra Urruela

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 using 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

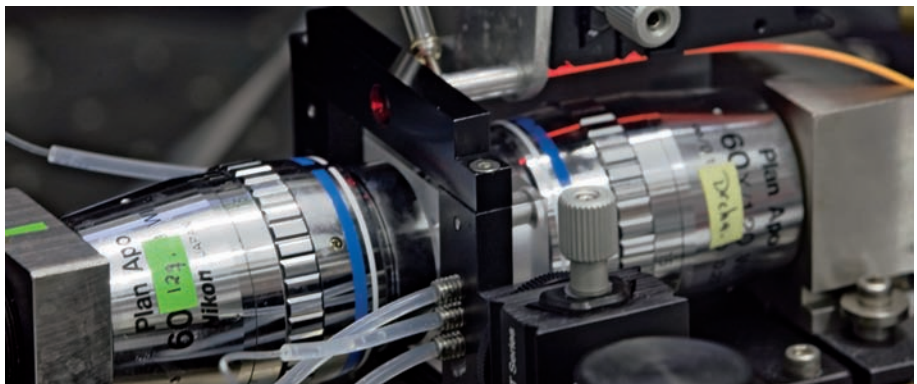
Many essential processes inside the cell involve mechanical tasks, which are carried out by specialized proteins called molecular motors. They are able to convert chemical energy into mechanical work at the molecular scale and therefore, present interesting biomedical and nanotechnological applications.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

Relevant publications

- Proofreading Dynamics of a Processive DNA Polymerase. Ibarra B. *et col. EMBO Journal* **28**, 2794-2802 (2009)
- Purification and functional characterization of p16, the ATPase of the bacteriophage Phi29 packaging machinery Ibarra B. *et col. Nucleic Acids Res.* **29**, 4264-4273 (2001)
- Topology of the components of the DNA packaging machinery in the phage Phi29 prohead Ibarra *B. et col. J. Mol. Biol.* **298**, 807-815 (2000)

José Alberto Morín

PhD student



AFM / Fluorescence microscopy of biomembranes

Prof. Marisela Vélez Tirado

Associated Senior Scientist

Ph.D.: University of Michigan, USA

Previous Position: Instituto de Catálisis CSIC, Madrid. Spain

Degree in Biology (biochemistry) Autonomus Universtity of Madrid (June 1982). Doctor of Philosophy (Ph.D): Biophysics. University of Michigan (USA) (August 1989). Dr. Vélez returned to Spain to work on the application of time resolved fluorescence spectroscopy of membrane fluorescent probes at the Physical Chemistry Institute "Rocasolano" (CSIC). Dr. Vélez joined the Condensed Matter Department at the Universidad Autonoma de Madrid (UAM) to work on the application of AFM to the study of biological surfaces, and then the Insitituto de Catálisis y Petroleoquímica (CSIC) to work on the structural characterization and development of amperometric biosensors based on the controlled anchoring of redox proteins. In 2001 she returned to the UAM and started working on the structural and dynamic characterization of the membrane associated protein complexes involved in bacterial cell division. and since 2008?? Dr. Velez is currently at the CSIC, at the Instituto de Catálisis y Petroleoquímica.

Research lines

Dr. Vélez´s main research interest is related to understanding biological processes that take place on biological surfaces. She has worked on reconstituting *in vitro* the initial stages of the bacterial division complex. Her approach is to characterize the structure and dynamics at the single molecule level of the polymerization process of the main participant, the bacterial cytoskeletal protein FtsZ. High resolution information of the surface polymerization process under different conditions is analysed theoretically to better understand the main protein-protein interactions governing the assembly process. She has more recently started a new research line related to the use of self assembling biological structures as biotemplates to organize inorganic gold or magnetic particles.

Relevant publications

- "The cooperative behavior of E. coli cell division protein FtsZ assembly involves the preferential cyclization of long single-stranded fibrils» J.M. González *et col. Proc. Natl. Acad. Sci. USA* **102**, 1895-1900 (2005)
- "The bacteriophage ϕ29 head-tail connector imaged at high resolution with atomic force microscopy in buffer solution» Müller, D.J. *et col. EMBO Journal* **16**, 2547-2553 (1997)
- "Rotational mobility of clustered and non-clustered acetylcholine receptors on rat myotubes» Vélez, M. *et col. J. Cell. Biol.* **110**, 2049-2059 (1990)

Dr. Santiago Casado

Postdoc

Universidad de Cantabria, Spain

Mechanical properties of proteins

Prof. Mariano Carrión Vázquez

Associated Senior Scientist

Ph.D.: Universidad Autónoma de Madrid, Spain

Previous Position: Instituto Cajal-CSIC Madrid. Spain

Mariano Carrión-Vázquez studied biochemistry in the University of Valencia, obtaining his PhD in neurobiology in 1993 at the Universidad Autónoma de Madrid. With Prof. Julio Fernández focused later on protein nanomechanics, first as a postdoctoral student at the Mayo Clinic (Rochester, MN) and later as an assistant professor at the Columbia University (New York, NY). He developed the methodology of polyproteins as unequivocal single-molecule markers, which has allowed the later progress of the field. In his group at the Cajal Institute (CSIC) and IMDEA Nanoscience he focuses on the nanomechanics of proteins of the nervous system.

Research lines

General title: Protein nanomechanics

- Nanomechanics of proteins from the nervous system: cell adhesion proteins, membrane fusion proteins neurotoxic proteins, and scaffolding proteins.
- Nanomechanical analysis of bionanomachines from the nervous system: proteasome, chaperones and adhesion machinery.
- Development of force sensors for the nanomechanical analysis of proteins in vivo.
- Applications of nanomechanical analysis to proteomics.

Relevant publications

- "On the remarkable mechanostability of scaffoldins and the mechanical clamp motif" Valbuena A. et. col. *Proc. Natl. Acad. Sci USA* **106,** 13791-13796 (2009)
- "The mechanical stability of ubiquitin is linkage dependent" Carrión-Vázquez, M et col. *Nature Str. Biol.* **10,** 738-743 (2003)
- Mechanical and chemical unfolding of a single protein: a comparison" Carrión-Vázquez, M. et col. *Proc. Natl. Acad. Sci. USA* **96,** 3694-3699 (1999)

programme 5
nanoelectronics and superconductivity

This programme deals with the **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 Programme 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 are **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) affect superconductivity can be explored.

Electrical transport in nanosytems

Prof. Nicolás Agraït de la Puente

Associated Senior Scientist
Ph.D:UNED, Spain
Previous Position: 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 50 publications in peer-reviewed journals summing over 3,500 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 transport and vibrational spectroscopy.

Research lines

- Transport through single molecules. Systematic study of 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

- «Study of electron-phonon interactions in a single molecule covalently connected to two electrodes» Hihath J, Arroyo C. R., Rubio-Bollinger G., Tao, NJ, Agrait N *Nano Letters* **8**, 1673-1678 (2008)
- "Quantum properties of atomic-sized conductors"N. Agrait, A. Levy-Yeyati, J.M. van Ruitenbeek *Phys. Reps.* **377**, 81-380 (2003)
- "Formation and manipulation of a metallic wire of single gold atoms"A.I, Yanson, G. Rubio Bollinger, H.E. van den Brom, N. Agraït, J.M. van Ruitenbeek *Nature* **395,** 783-785 (1998)

Electrical conductivity of single molecules

Dr. Teresa González Pérez

Researcher

Ph.D. Universidad de Santiago de Compostela, Spain

Previous Position: University of Basel. Switzerland

Teresa González graduated in Physics in 1996 from the University of Santiago de Compostela (Spain). Where she got a Ph. D. in 2003 with a work on melt-textured high-Tc superconductors that was awarded with the *Premio Extraordinario de Doctorado*. From 2004 to 2008 Dr. González has been Research Assistant at Basel University (Switzerland) with Professor Christian Schönenberger. 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, dealing with the electrical properties of single molecules using a scanning tunnelling microscope and exploring different techniques to contact an individual molecule, and study its properties under different conditions, at low and room temperatures. Currently her research instersts deal with the testing conductivity of molecules such as alkanes, oligo(phenyleneethynylenes), fluorenes, phthalocyanines; and different chemical binding groups such as thiols, amines or C60.

Relevant publications:

- « Molecular junctions based on aromatic coupling" M. T. González *et col. Nature Nanotechnology* **3**, 569-574 (2008)
- " Electrical conductance of molecular junctions by a robust statistical analysis" M. T. González *et col. Nano Letters* **6**, 2238-2242 (2006)
- "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

Prashant Verma

Internship

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 magnetic nanoarrays. 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.

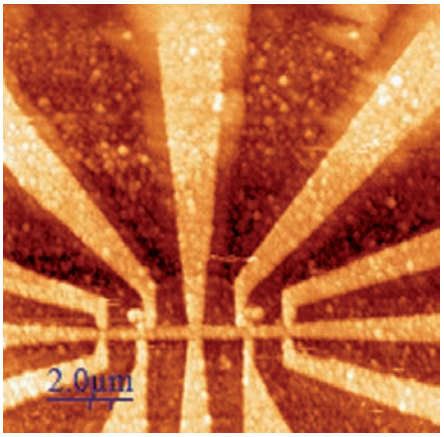
Relevant publications

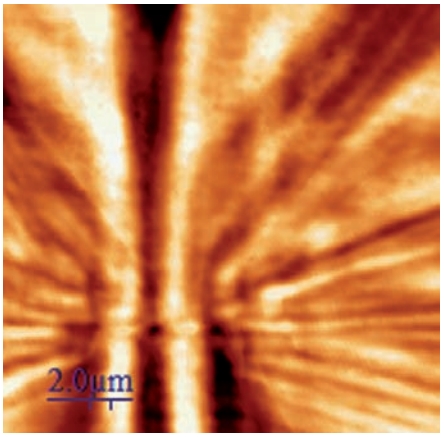
- *Rocking ratchet induced by pure magnetic potentials with broken reflection symmetry* D. Perez de Lara *et col. Phys. Rev.* B **80**, 224510-224517 (2009)
- *Static and dynamic properties of annular Josephson junctions with injected current.* D. Perez de Lara *et col*. *Phys. Rev.* B **73**, 214530 - 214540 (2006)
- *Recent developments in Superconducting Tunnel Junctions for Ultraviolet, Optical & Near Infrared,* A. Peacock *et col*. *Astronomy. Astrophys. Suppl. Ser.* **127**, 497-504 (1998)

programme 6
nanoacoustics and nanophotonics/nanooptics

The programme deals with Nanoacoustics and Nanophotonics, which have to do with phenomena in which either the (acoustic or optical) radiation *or* the matter are confined at sub-micrometer dimensions. In nanoacoustics, phase-sensitive acoustic microscopy, imaging, and non-destructive testing are developed, while the field of nanophotonics is both a Nobel Prize-winning science and a multibillion-dollar industry, underpinning applications such as telecommunications, data storage, and materials processing. Nanostructures and nanostructured materials exhibit fascinating optical response, and nanoscale-optics has already shown many surprises, such as extraordinary optical transmission, superlensing, giant field enhancement, optical trapping, and imaging with resolution far beyond the diffraction limit.

We also explore semiconductor materials as advantageous candidates to be the physical basis of storage and manipulation of quantum information. The growth and characterisation of semiconductor nanostructures, and photonic devices, such as LEDs, Lasers, pillars and photonic crystal cavities is also relevant for activities in Programme 1). The scientists in this Programme have developed optical microscopy in the near and far field, optical spectroscopy with coherent and nonlinear techniques, Raman and FTIR spectroscopy and spectroscopic SNOM.





Nanooptics and nanoacoustics

Prof. Reinhold Wannemacher

Senior Researcher

Ph.D: University of Darmstadt, Germany

Previous Position: University of Darmstadt, 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

- "Phase-sensitive acoustic imaging and micro-metrology of polymer blend thin films " W. *et col. Europhys. Lett.* **64**, 830-836 (2003)
- "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)

Optical properties of semiconducting nanostructures

Dr. Daniel Granados Ruiz

Researcher

Ph.D.: Universidad Autónoma de Madrid. Spain.

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

Daniel Granados worked for a Ph.D. 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 theNano-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.

Research lines

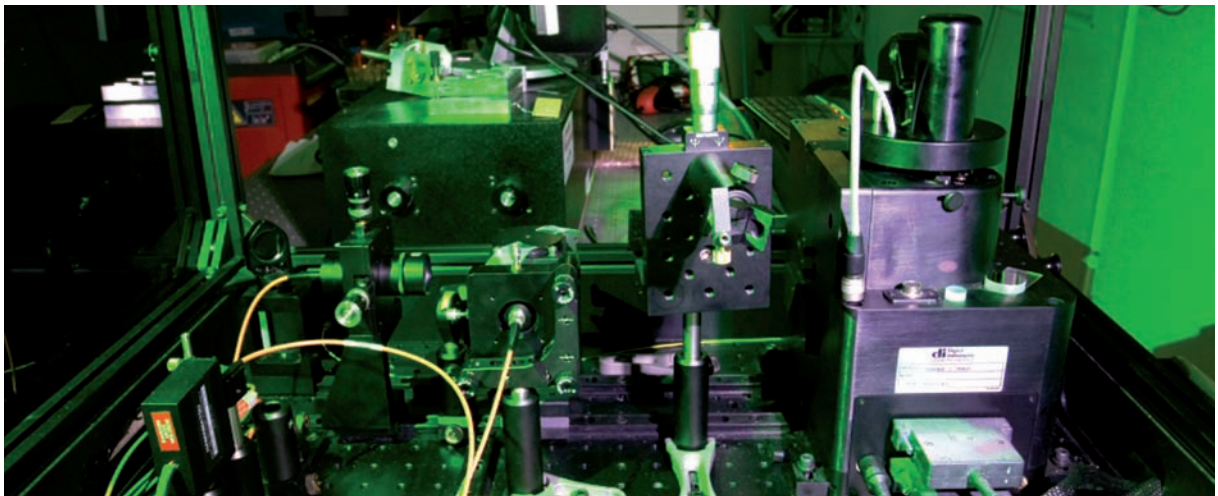
My research interests are the growth and characterisation of semiconductor nanostructures, and the development and characterisation of photonic devices, such as LEDs, LASERS, pillars and photonic crystal cavities, for optoelectronics, quantum optics and quantum information applications.

Relevant publications:

- "Oscillatory persistent currents in self-assembled quantum rings" Kleemans, NAJM *et al. Phys. Rev. Lett.* **99**, 146808-146810 (2007)
- "Manipulating exciton fine structure in quantum dots with a lateral electric field" Gerardot, BD *et al. Appl. Phys. Lett.* **90**, 041101- 041103(2007)
- "In(Ga)As self-assembled quantum ring formation by molecular beam epitaxy". Granados, D *et al.* Appl. Phys. Lett. **82**, 2401-2403 (2003)

Ramón Bernardo

Ph. D. Student



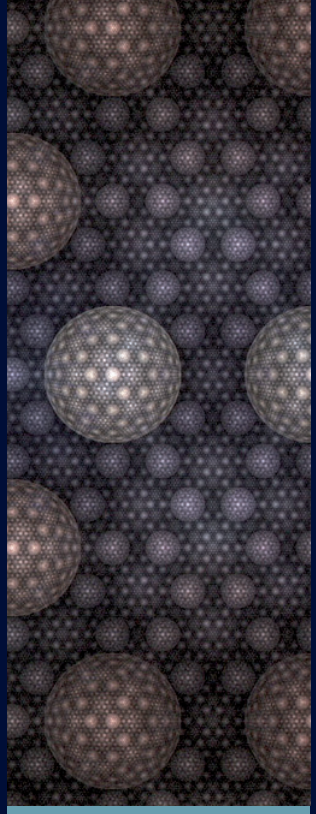
management

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



3 scientific infrastructure & labs

Scaninng Tunneling Microscpy

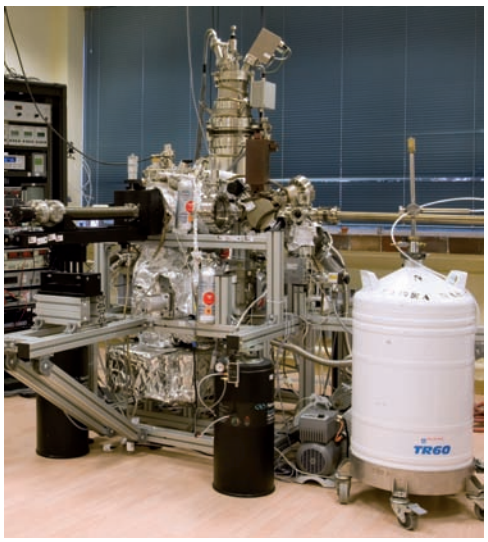
- LT-UHV-STM
- VT-UHV-STM
- Spin-polarized STM

Atomic Force Microscpy

- Ambient AFM

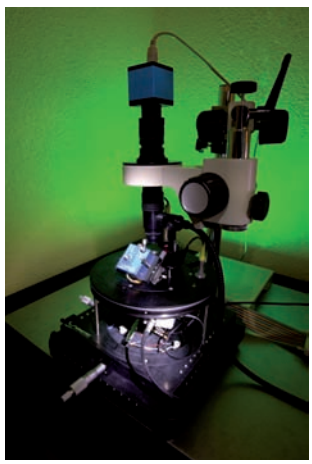
Single Molecule Conductivity

- STM



Fluorescence/Force Microscopy

- AFM/Fluorescence Microscope

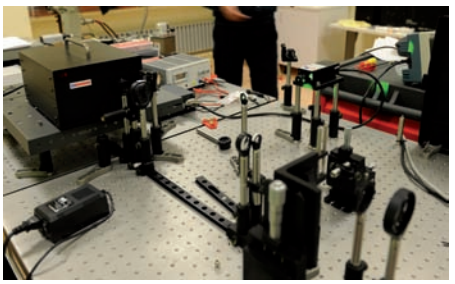


Advanced Optical Characterization

- Spectrofluorometer
- Absorption spectrophotometer

Nanophotonics

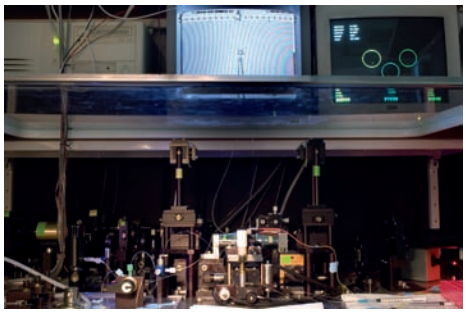
- Pump-probe spectroscopy
- SNOM



Nanoacoustics

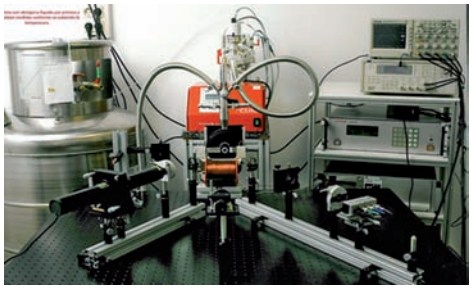
Optical Manipulation of Biobjects

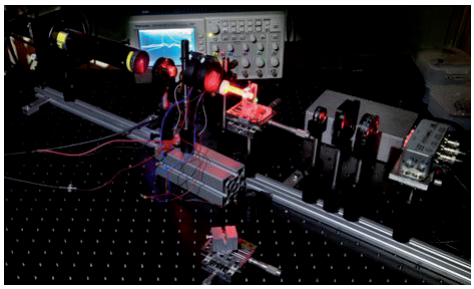
- Optical Tweezers



Kerr Magnetometry

- Vectorial MOKE
- MOKE-MR

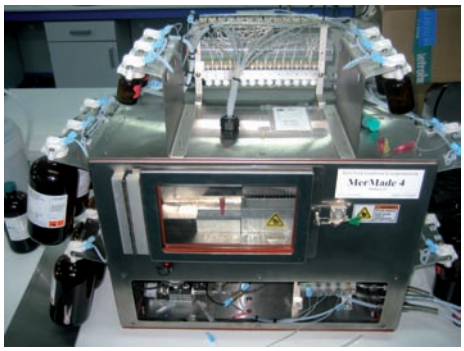


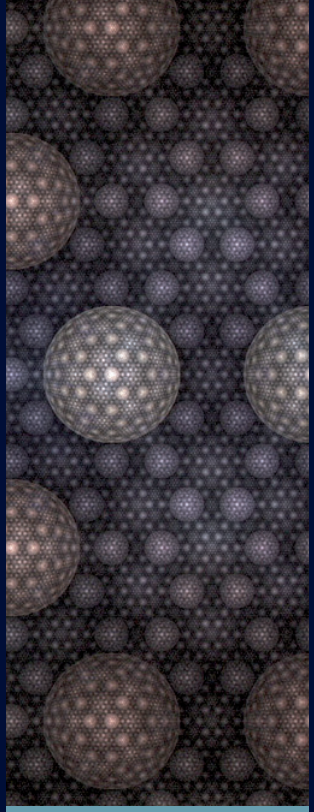


Epitaxial Growth

- Organic/Inorganic MBE
- XPS

Magnetic Hyperthermia
Chemical Synthesis
Biochemistry





4 scientific report

4.1. Scientific publications and patents

4.1.1. Scientific publications

1. *Lipid domains and mechanical plasticity of Escherichia coli lipid monolayers* Iván López-Montero, Laura R Arriaga, German Rivas, Marisela Vélez, Francisco Monroy. *Chemistry and Physics* **163**, 2010, 56

2. *Plasmonic modes confined in nanoscale thin silver films deposited onto metallic substrates* A. Politano, V. Formoso and G. Chiarello. *Journal of Nanoscience and Nanotechnology* 2010, **10**, 1313

3. *Ultrafast optical gain switch in organic photonic devices* T. Virgili, J. Clark, J. Cabanillas-González, L. Bazzana, K.C. Vishnubhatla, R. Osellame, R. Ramponi and G. Lanzani. *J. Mater. Chem.* 2010, **20**, 519

4. *Periodically modulated geometric and electronic structure of graphene on Ru(0001)* B Borca, S Barja, M Garnica, J J Hinarejos, A L Vázquez de Parga, R Miranda and F Guinea. *Semicond. Sci. Technol.* **25,** (2010) 034001

5. *CO-promoted formation of the alkali-oxygen bond on Ni(111)* A. Politano, A.R. Marino, G. Chiarello *Journal of Chemical Physics* **132**, 044706 (2010)

6. *CdSe/CdS Nanoparticles immobilized on pNIPAM-based microspheres* A.Salcher, M. Nikolik, S. Casado, M. Vélez, H. Weller and B.H. Juárez. *J. Mater. Chem.* 2010, **20**, 1367

7. *Alkali-promoted stabilization of subsurface oxygen on Cu(111)* A. Politano A.R. Marino, G. Chiarello. *Chemical Physics* **367** (2010) 148

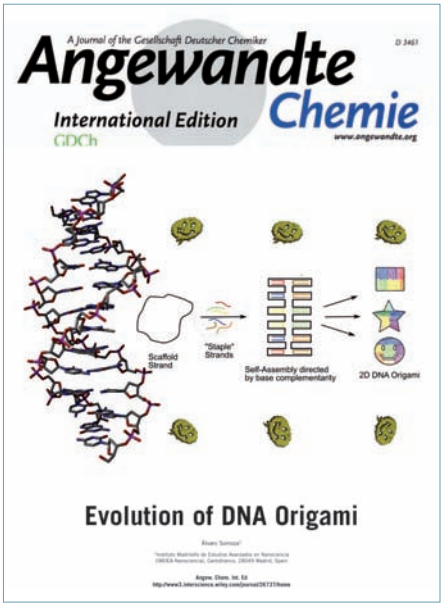
8. *Sputtering-induced modification of the electronic properties of Ag/Cu(111)* A. Politano and G. Chiarello *J. Phys. D: Appl. Phys.* **43** (2010) 085302

9. *A high-reflectivity atom-focusing mirror stable at room temperature* D. Barredo, G. Laurent, F. Calleja, P. Nieto, J.J. Hinarejos, A.L. Vázquez de Parga, D. Farías, and R. Miranda. *Applied Physics Letters* **96**, 081901 (2010)

10. *A bis-exTTF macrocyclic receptor that associates C60 with micromolar affinity* H. Isla, M. Gallego, E.M. Pérez, R. Viruela, E. Ortí and N. Martín *J. Am. Chem. Soc.* 2010, **132**, 1772

11. *Imaging and quantifying perpendicular exchange biased systems by soft x-ray holography and spectroscopy* C. Tieg, E. Jiménez, J. Camarero, J. Vogel, C. Arm, B. Rodmacq, E. Gautier, S. Auffret, B. Delaup, G. Gaudin, B. Dieny, and R. Miranda. *Applied Physics Letters* **96**, 072503 (2010)

12. *An ellipsoidal mirror for focusing neutral atomic and molecular beams* K Fladischer, H Reingruber, T Reisinger, V Mayrhofer, W E Ernst, A E Ross, D A MacLaren, W Allison, D Litwin, J Galas, S Sitarek, P Nieto, D Barredo, D Farías, R Miranda, B Surma, A Miros, B Piatkowski, E Søndergård and B Holst. *New Journal of Physics* **12** (2010) 033018



13. *Weak forces at work in dye-loaded zeolite materials: spectroscopic investigation on cation-sulfur interactions* G. Macchi, C. Botta, G. Calzaferri, M. Catti, J. Cornil, J. Gierschner, F. Meinardi, R. Tubino. *Phys. Chem. Chem. Phys.* **12** (2010) 2599

14. *Characterization of single-molecule pentanedithiol junctions by inelastic electron tunneling spectroscopy and first-principles calculations* Arroyo CR, Frederiksen T, Rubio-Bollinger G, Velez M, Arnau A, Sánchez-Portal D, Agrait N. *Phys. Rev. B* **81,** 075405 (2010)

15. *Theoretical characterization of charge transport in one-dimensional collinear arrays of organic conjugated molecules* L. Viani, Y. Olivier, S. Athanasopoulos, D.A. de Silva Filho, J. Hulliger, J.-L. Brédas, J. Gierschner, J. Cornil. *ChemPhysChem* **11** (2010) 1062

16. *The experimental determination of the conductance of single molecules* Nichols RJ, Haiss W, Higgins SJ, Leary E, Martin S, Bethell D. *Phys. Chem. Chem. Phys.* 2010, **12**, 2801

17. *Jean-Pierre Sauvage: The Lord of the Rings* Martín N. *Eur. J. Org. Chem.* 2010, 1407

18. *Molecular tweezers for fullerenes* Pérez EM, Martín N. *Pure Appl. Chem.* 2010, **82**, 523

19. *Carbon fibre tips for scanning probe microscopy based on quartz tuning fork force sensors* Castellanos-Gómez A, Agrait N, Rubio-Bollinger G. *Nanotechnology* **21**, 145702 (2010)

20. *Efficient electron transfer and sensitizer regeneration in stable π-extended tetrathiafulvalene-sensitized solar cells* Sophie Wenger, Pierre-Antoine Bouit, Qianli Chen, Joel Teuscher, Davide Di Censo, Robin Humphry-Baker, Jaques-E. Moser, Juan Luis Delgado, Nazario Martín, Shaik M. Zakeeruddin and Michael Gratzel. *J. Am. Chem. Soc.* 2010, **132**, 5164

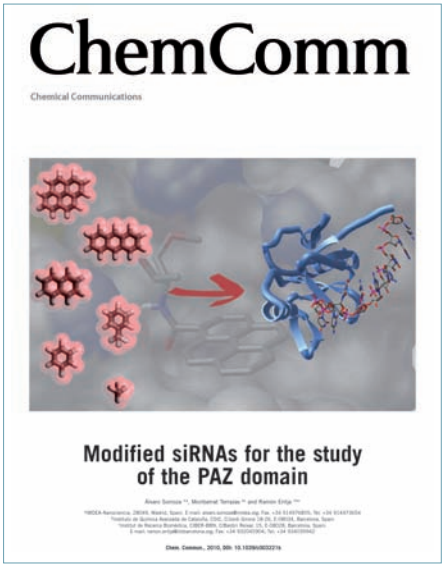
21. *Dynamical screening of the exciton resonance in conjugated polymers/carbon nanotubes composite* L. Lüer, S. Hoseinkhani, M. Meneghetti, G. Lanzani. *Physical Review B* **81** (2010) 155411

22. *Understanding biology by stretching proteins: recent progress* Galera-Prat A, Gómez-Sicilia A, Oberhauser AF, Cieplak M, Carrion-Vazquez M. *Current Opinion in Structural Biology* **20**, 63 (2010)

23. *Tripodal exTTF-CTV hosts for fullerenes* E Huerta, H Isla, E M Pérez, C Bo, N Martín and J de Mendoza. *J. Am. Chem. Soc.* 2010, **132**, 5351

24. *Growth and structure of self-assembled monolayers of a TTF derivative on Au (111)* Christian Urban, David Écija, Yang Wang, Marta Trelka, Iulian Preda, Antje Vollmer, Nicolás Lorente, Andrés Arnau, Manuel Alcamí, Leonardo Soriano, Nazario Martín, Fernando Martín, Roberto Otero, José M. Gallego, and Rodolfo Miranda. *J. Phys. Chem. C* **114**, 6503 (2010)

25. *Donor-acceptor conjugates of lanthanum endohedral metallofullerene and pi-extended tetrathiafulvalene* Takano Y., Herranz M.A., Martín N., Radhakrishnan S.G., Guldi D.M., Tsuchiya T., Nagase S., Akasaka T., *J. Am. Chem. Soc.* 2010 **132** ,8048



26. *Charge-transfer-induced structural rearrangements at both sides of organic/metal interfaces* Tzu-Chun Tseng, Christian Urban, Yang Wang, Roberto Otero, Steven L. Tait, Manuel Alcamí, David Écija, Marta Trelka, José María Gallego, Nian Lin, Mitsuharu Konuma, Ulrich Starke, Alexei Nefedov, Alexander Langner, Christof Woll, María Ángeles Herranz, Fernando Martín, Nazario Martín, Klaus Kern and Rodolfo Miranda. *Nature Chemistry* **2**, 374 (2010)

27. *Reversible attachment of platinum alloy nanoparticles to nonfunctionalized carbon nanotubes* Beate Ritz, Hauke Heller, Anton Myalitsin, Andreas Kornowski, Francisco J. Martin-Martinez, Santiago Melchor, Jose A. Dobado, Beatriz H. Juárez, Horst Weller, and Christian Klinke. *ACS Nano* **4,** 2438 (2010)

28. *Enzymatic anodes for hydrogen fuel cells based on covalent attachment of Ni-Fe hydrogenases and direct electron transfer to SAM-modified gold electrodes* Olaf Rödiger, Cristina Gutiérrez-Sánchez, David Olea, Inés A.C. Pereira, Marisela Vélez, Víctor M. Fernández, Antonio L. De Lacey. *Electroanalysis* 2010, **22**, 776

29. *Electron donor-acceptor interactions in regioselectively synthesized exTTF2–C70(CF3)10 Dyads*. Yuta Takano, M. Ángeles Herranz, Nazario Martín, Gustavo de Miguel Rojas, Dirk M. Guldi, Ivan E. Kareev, Steven H. Strauss, Olga V. Boltalina, Takahiro Tsuchiya, Takeshi Akasaka. *Chem Eur. J.* **16**, 5343 (2010)

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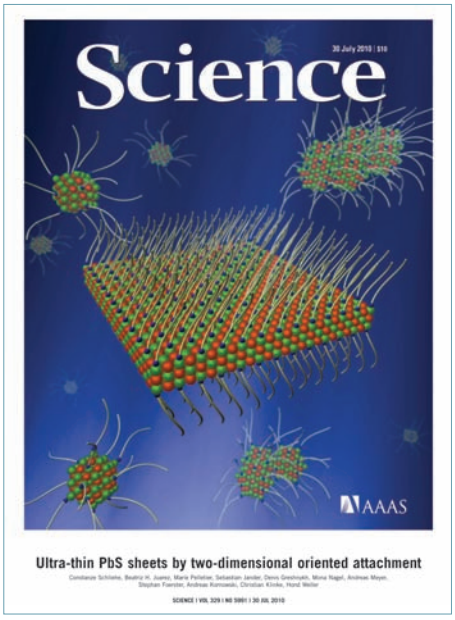

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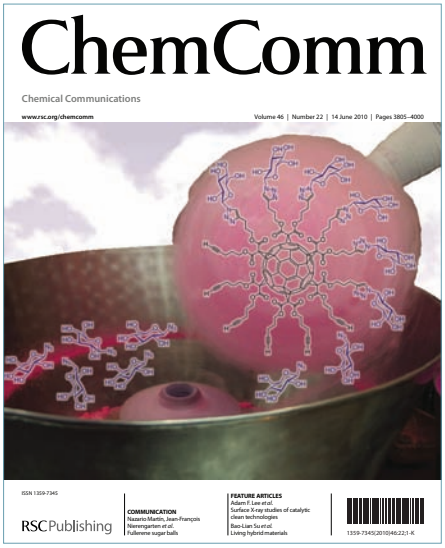

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67. *Conducting interfaces between band insulating oxides: the $LaGa_{0.3}$ /$SrTiO_3$ heterostructure* P. Perna, D. Maccariello, M. Radovic, U. ScottidiUccio, I. Pallecchi, M. Codda, D. Marré, C. Cantoni, J. Gazquez, M. Varela, S.J. Pennycook, F. Miletto Granozio. *Applied Physics Letters* **97**, 152111 (2010)

68. *Uniaxial magnetic anisotropy induced by vicinal surfaces in half metallic $La_{0.7}Sr_{0.3}MnO_3$ thin films* P. Perna, E. Jiménez, F.J. Teran, L. Mèchin, J. Camarero and R. Miranda. *Mater. Res. Soc. Symp. Proc.* **1198-E01-04** (2010)

69. *Ferromagnetic proximity effect in a-Co_xSi_{1-x}/Nb bilayers: Role of magnetic disorder and interface transparency* A. Alija, D. Pérez de Lara, E.M. González, G.N. Kakazei, J.B. Sousa, J.P. Araujo, A. Hierro-Rodriguez, J.I. Martín, J.M. Alameda, M. Vélez, and J.L. Vicent. *Phys. Rev.* B **82**, 184529 (2010)

70. *Growth and reductive transformation of a gold shell around pyramidal cadmium selenide nanocrystals* Michaela Meyns, Neus G. Bastus, Yuxue Cai, Andreas Kornowski, Beatriz H. Juárez, Horst Weller, Christian Klinke. *J. Mater. Chem.*, Advance Article. 10602, 2010. DOI: 10.1039/C0JM03004J[3]

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book chapters

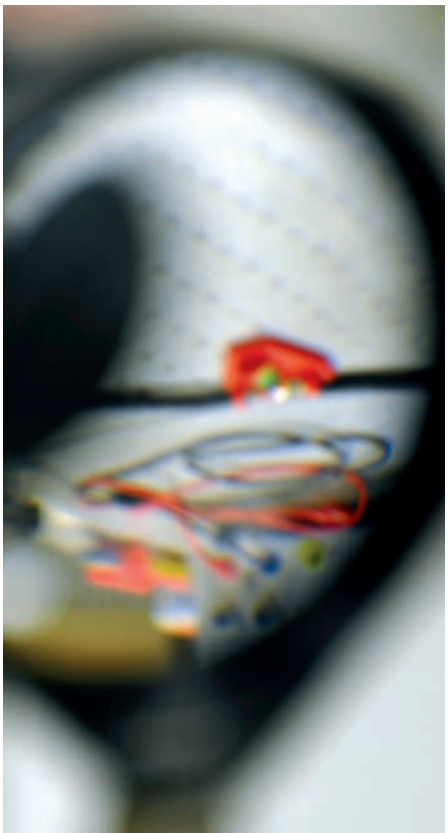
patents

72. *Calorimetric study of a series of designed proteins: modular structure and modular folding* A.L. Cortajarena, and L. Regan. *Protein Science*. On line article 2010. DOI 10.1002/pro.564

73. *Quantum hall states under conditions of vanishing Zeeman energy* F.J. Teran, M. Potemski, D.K. Maude, T. Andrearczyk, J. Jaroszyński, T. Wojtowicz, and G. Karczewski *Phys. Rev.* B **82**, 245120 (2010)

74. *Oligothienoacenes versus oligothiophenes: Impact of ring fusion on the optical properties* J. Aragó, P.M. Viruela, J. Gierschner, E. Ortí, B. Milián Medina. *Phys. Chem. Chem. Phys*. In press, 2010

75. *Ultra-high resolution thin film thickness delineation using reflection phase-sensitive acoustic microscopy* E. Ahmed Mohamed, A. Kamanyi, M. von Buttlar, R. Wannemacher, K. Hillmann, W. Ngwa and W. Grill. *Acoustical Imaging,* **30**. In press, 2010



4.1.2. Book chapters

1. *Atomic Wires* N. Agraït *in Handbook of Nanophysics*, K. Sattler (Ed.), Taylor and Francis, 2010. ISBN: 978-1-4200-7543-4

2. *Spectroscopic signatures of photogenerated radical anions in polymer-[c70]fullerene bulk heterojunctions* M. Liedtke, A. Sperlich H. Kraus, C. Deibel, V. Dyakonov, S. Filippone, J.L. Delgado, N. Martin, O.G. Poluektov in *Molecular and supramolecular chemistry of fullerenes and carbon nanotubes,* 217th ECS Meeting Vancouver Canada. Meeting Transactions, **28**, 2010, pp. 3-10. http://dx.doi.org/10.1149/1.3503347

3. *Carbon nanotubes, electronic structure and spectroscopy* G. Lanzani, L. Lüer in *Comprehensive nanoscience & technology,* V. Vardeny (Ed.), Elsevier, 2010. pp. 29-33. ISBN: 978-0-12-374390-9

4. *Imaging biological samples using atomic force microscopy* De Pablo, P.J. and Carrión-Vázquez, M. In Yuste, R. (Ed.). *Optical Imaging Techniques: A Laboratory Manual*. Cold Spring Harbor Laboratory Press, New York. In press, 2010

5. *The folding of repeat proteins* A.L. Cortajarena and L. Regan. *Comprehensive Biophysics.* Elsevier Ed. In press, 2010

4.1.3. Patent

1. *Fotodetector sensible a la posición, procedimiento de obtención del mismo y procedimiento de medida de la respuesta del fotodetector.* Juan Cabanillas (Fundación IMDEA Nanociencia, Madrid) & Mariano Campoy (ICMAB-CSIC, Barcelona). **P201031818.** 10 December 2010.

4.2. International congresses

4.2.1. Invited & plenary talks

11/12/ 2009

Nano2009 Workshop. Braga, Portugal

- *Periodically rippled graphene: an electronically and structurally nanostructured material.* Rodolfo Miranda

12/03/ 2010

Royal Society of Chemistry Symposium on Molecular Nanoscience. Imperial College, London, U.K.

- *Molecular receptors for fullerenes: a concave-convex effect?* Nazario Martín

08-11/04/ 2010

1st Conference in Mechanics of Large Molecular Assemblies: from Single Molecules to Cell Shape. Mallorca, Spain

- *Dynamics of DNA replication under mechanical tension.* Borja Ibarra

02-5/05/ 2010

International Workshop on Molecular Materials Sanxenxo, Pontevedra, Spain

- *Epitaxial graphene: a new paradigm in organic materials.* Rodolfo Miranda
- *Molecular receptors for carbón nanostructures.* Nazario Martín

20/05/ 2010

International Arianne Conference on the Future of Space. Madrid, Spain

- *Nanotechnology applications for aerospace industry.* Rodolfo Miranda

25-26/05/ 2010

International Symposium: Nanomaterials and Functionality. Fundación Ramón Areces Valencia, Spain

- *Fullerenes for organic electronics.* Nazario Martín

01/06/ 2010

French Atomic Energy and Alternative Energies Commission (CEA). Strategy & Management Conference, Madrid, Spain

- *A new instrument to generate scientific knowledge and technology transfer.* Rodolfo Miranda

6th Nanoscience and Nanotechnology Conference (Nano-TRUI), Izmir, Turquia

16/06/ 2010 *Concave-convex supramolecular interactions: the reach fullerenes receptors.* Nazario Martín

18/06/ 2010 *Fullerenes for organic electronics.* Nazario Martín

26-06/2-07/ 2010

Gordon Research Conferences: Single Molecule Approaches to Biology. Lucca, Italy

- *DNA Unwinding dynamics of a processive DNA polymerase.* Borja Ibarra

01/07/ 2010

Vegyészkonferencia és 53. Magyar Spektrokémiai Vándorgyúlés. Hajdúszoboszló, Hungary

- *Concave-convex supramolecular interactions: the rearch for fullerenes receptors.* Nazario Martín

01-02/07/ 2010

Marie Curie European Conference. Turin, Italy

- *Science communication.* L. Lüer

04 –09/ 07/2010

European Conference on Atoms Molecules and Photons ECAMP10. Salamanca, Spain

- *Molecular self assembly on metal surfaces.* Rodolfo Miranda

07-10/07/ 2010

IV Spanish-Portuguese Biophysical Congress, July 7-10 2010, Zaragoza, Spain

- *Nanomecanics of the cellulosome: moving from individual cohesin modules to the whole complex.* Mariano Carrión

23-27/08/ 2010

Electron Controlled Chemical Lithography Congress, Sterdyn, Poland

- *Potential energy landscape for hot electrons in periodically nanostructured graphene.* A.L. Vázquez de Parga

29-08-02-09/ 2010

3rd Euchems, Chemistry Congress, Nuremberg, Germany

- *Periodiacally rippled graphene: a two dimensional playground.* A.L. Vázquez de Parga

01-03-09/ 2010

Workshop on Inelastic Phenomena, San Sebastián, Spain

- *Inelastic electron tunneling spectroscopy and transport in single molecules.* N. Agraït

01-10/10/ 2010

Fullerene Silver Aniversary Symposium Hersonissos, Crete, Greece

- *Electroactive supramolecular receptors for fullerenes.* Nazario Martín
- *Periodically rippled epitaxial graphene: an electronically and structurally nanostructured material* Rodolfo Miranda

01-03/10/ 2010

SUPERIOR' Modeling workshop, Mons, Belgium

- *Conjugated polymers: insights from optical spectroscopy & theory.* Johannes Gierschner

07-10/10/ 2010

2nd workshop on Nanocarbon Optics, WNCO 2010, Niederstetten, Germany

- *Photoexcitation dynamics in π-conjugated systems: from time-dependent spectroscopic data to a photophysical model.* Larry Lüer

24-27/10/ 2010

7th ERA-Chemistry Flash Conference. Bioinspired Chemistry. 24-27 October 2010, Santiago de Compostela, Spain

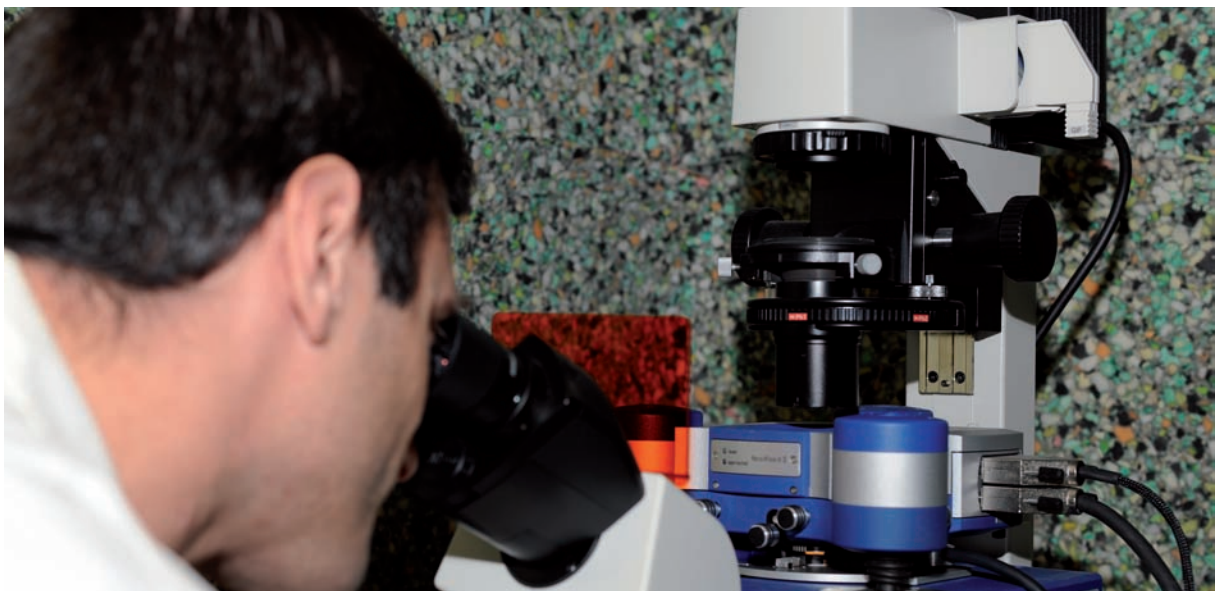
- *Supramolecular systems based on concave-convex complementarity: p-extended tetrathiafulvalenes and fullerenes.* Emilio Pérez

11-12/11/ 2010

IX SEQT Workshop "New Perspectives and Emerging Technologies in Drug Discovery". Baeza, Spain

- *Modified siRNAs for the study of RNA-protein interactions and nanoparticle functionalization.* Alvaro Somoza

invited & plenary talks



4.2.2. Regular contributions

05-09/01/ 2010

International Conference on Molecular Electronics, Emmetten, Switzerland

Posters

- *Single molecule junctions studied using a STM break-junction setup.* E. Leary, M.T. González, C. Arroyo, G. Rubio-Bollinger, N. Agraït
- *Tuning vibrations in single-molecule junctions: inelastic electron tunneling spectroscopy of an alkanedithiol* Carlos Arroyo Rodríguez, Marisela Vélez, Gabino Rubio-Bollinguer, Nicolás Agraït

Oral communications

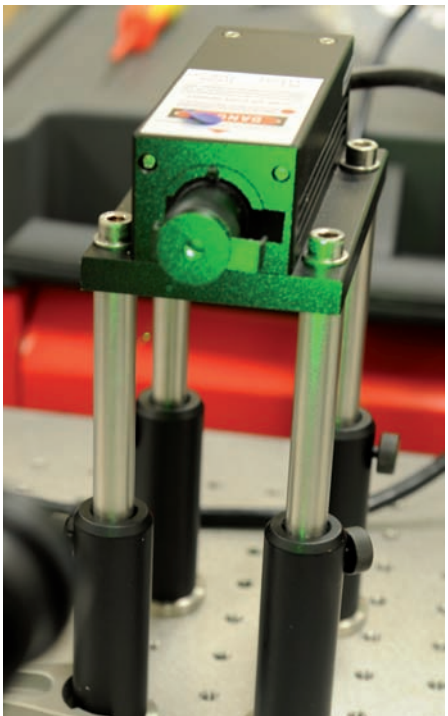
- *Molecular junctions based on a STM break-junction setup.* M.T. González, E. Leary, C. Arroyo, G. Rubio-Bollinger, N. Agraït
- *Single-molecule STM junctions: dumbbell molecules.* Edmund Leary, M. Teresa González, Carlos Arroyo, Gabino Rubio-Bollinger

21-23/01/ 2010

Symposium CPiC, Valencia, Spain

Oral communication

- *Conjugated donor-acceptor co-polymers by orbital design.* Johannes Giesrchner



03-05/02/ 2010

VI Reunión del Grupo Especializado de Física de Estado Sólido (GEFES), Real Sociedad Española de Física, Zaragoza, Spain

Poster

- *Electronic inhomogeneities of epitaxial graphene on Ru(0001) probed by dynamic STM and STS Measurements.* Andrés Castellanos-Gómez, B. Borca, S. Barja, M. Garnica, AL. Vázquez de Parga, R. Miranda, G. Rubio-Bollinger, N. Agrait
- *Superconducting vortex dynamics in Nb thin films induced by the magnetic states of Ni nanoring arrays* D. Pérez de Lara, E.M. González, A. Gutierrez and J. L. Vicent
- *Control of the chirality and polarity of magnetic vortices in triangular nanodots* M. Jaafar, R. Yanes, D. Perez de Lara,_O. Chubykalo-Fesenko, A. Asenjo, E.M. González, J.V. Anguita, M. Vazquez and J.L. Vicent

20-24/02/ 2010

54th Biophysical Society Meeting. San Francisco, USA

Poster

- *E. coli Single Ftsz dynamic rings: growing, cyclization, opening, reannealing and depolimerization* Pablo Mateos-Gil, Alfonso Páez, Ines Hörger, Pedro Tarazona, Jesús Mingorance, Germán Rivas, Marisela Vélez

07-13/03/ 2010

Symposium on Surface Science 2010 St. Christoph/ Arlberg, Austria

Oral communication

- *Field emission resonances on periodically rippled graphene.* B. Borca, S. Barja, M. Garnica, D. Sánchez-Portal,S. Silkin, E. Chulkov, F. Hermans, J.J. Hinarejos, A.L. Vázquez de Parga, A. Arnau, P.M. Echenique, R. Miranda

regular

contributions

15-19/03/ 2010

APS March Meeting 2010, Portland, USA

Oral presentations

- *Tuning vibrations in single-molecule junctions: inelastic electron tunneling spectroscopy of an alkanedithiol.* N. Agrait, C.R. Arroyo, T. Frederiksen, G. Rubio Bollinger, M. Vélez, A. Arnau, D. Sánchez-Portal
- *Electronic inhomogeneities of epitaxial graphene on Ru(0001) probed by dynamic STM and STS measurements.* A. Castellanos-Gomez, B. Borca, Sara Barja, M. Garnica, A Vázquez de Parga, R. Miranda, G. Rubio-Bollinger, N. Agrait

11-15/04/ 2010

NaNax4: Nanoscience with Nanocrystals 2010, Munich, Germany

Poster

- *CdSe/CdS nanoparticles immobilized on pNIPAm-based microspheres.* A. Salcher, M.S. Nikolic, S. Casado, M. Vélez, H. Weller, and B.H. Juárez

15-16/04/ 2010

I Spanish National Congress on the New Technologies and their consequences for security: Internet, Biotechnology and Nanotecnology, Madrid, Spain

Oral communication

- *The Risks of Nanoscience and Nanotechnology.* J. Ricardo Arias-González

15-18/04/ 2010

FUNMOLS Workshop at Muggendorf, Germany

Oral communication

- *Studying single molecules with Scanning Tunneling Microscopy.* Charalambos Evangeli, M. Teresa González, Edmund Leary, Carlos R. Arroyo, Gabino Rubio-Bollinger, Nicolás Agraït

24-30/04/ 2010

217h Electrochemical Society, Vancouver, Canada

Oral communications

- *Carbon-based nanostructures for the preparation of efficient photovoltaic device.* Juan L. Delgado, Pierre-Antoine Bouit, Carmen Villegas, Nazario Martín
- *Single molecule electronics with fullerenes.* E. Leary, M.T. González, N. Agraït and N. Martín

Poster

- *Molecular engineering of π-extended tetrathiafulvalene (exTTF) for dye sensitized solar cells.* Pierre-Antoine Bouit, Sophie Wenger, Qianli Chen, Joël Teuscher, Davide Di Censo, Robin Humphry-Baker, Jaques-E. Moser, Juan Luis Delgado, Shaik M. Zakeeruddin, Michael Grätzel, Nazario Martín

02-05/05/ 2010

International Workshop on Molecular Materials Sanxenxo, Spain

Oral communications

- *Carbon-based nanostructures for the preparation of efficient photovoltaic device.* Juan L. Delgado, Pierre-Antoine Bouit, Carmen Villegas, Nazario Martín
- *Conjugated donor-acceptor co-polymers: band-gap engineering by orbital design.* Johannes Giesrchner

04-08/05/ 2010

International Workshop on Superconductivity in Reduced Dimensions, Salzburg, Austria

Oral communications

- *Synchronized controlled motion of the vortex lattice in hybrid superconducting/magnetic nanostructures.* David Pérez de Lara

14/05/ 2010

Yale Chemical Biology Symposium. New Haven, USA

Poster

- *Self-assembly of designed proteins into smart hydrogels and nanostructured films.* Aitziber L. Cortajarena. Tijana Z. Grove, and Lynne Regan. Best poster award

06-11/06/ 2010

2010 Gordon Research Conference, Biopolymers. Salve Regina University, Newport, USA

Poster presentations

- *Designing protein modules with tailored properties for biotechnological applications.* Aitziber L. Cortajarena, Tijana Z. Grove, and Lynne Regan
- *Self-assembly of designed proteins into smart hydrogels and nanostructured films* Aitziber L. Cortajarena, Tijana Z. Grove, and Lynne Regan

08-10/06/2010

EMRS 2010 spring meeting, Strasbourg, France

Oral communications

- *Charge carrier dynamics in carbon nanotubes traced by femtosecond spectroscopy.* L. Lüer, S. Hoseinkhani, J. Crochet, T. Hertel, P. Puschnig, C. Ambrosch-Draxl, G. Lanzani

17-18/06/ 2010

NanoMediterraneneo II. Alicante, Spain

Oral communication

- *Playing to combine nanocrystals.* B. Hernández C. Klinke y H. Weller

18/06/ 2010

Fotónica Aplicada para la Creación de Tecnologías Ópticas y su Trasferencia a Empresas Madrileñas, FACTOTEM. PCT, Leganés, Spain

Oral communication

- *Dinámica de estados de carga en OLEDs y células solares orgánicas.* Juan Cabanillas

04-07/07/ 2010

8th European Conference on Magnetic Sensors and Actuators, Bodrum, Turkey

Oral communication

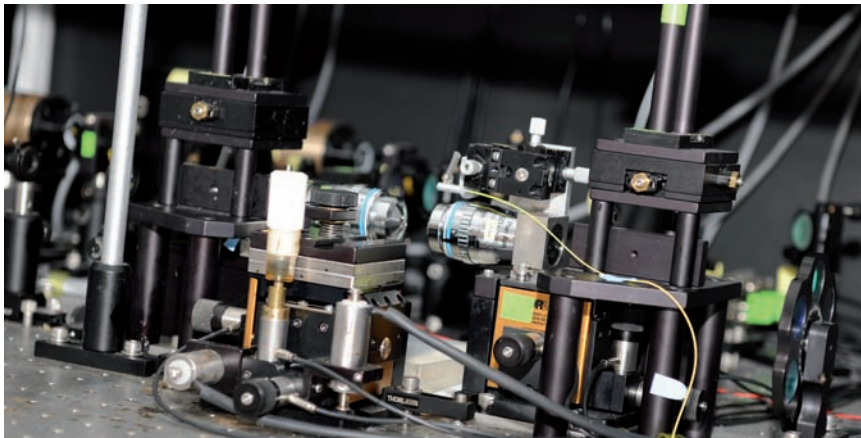
- *Development of a magneto-optical intracellular nanomanipulator: bringing single-molecule techniques inside the cell.* A.M. de Aguilera, M. Vázquez, J.M. Valpuesta, J.L. Carrascosa and J.R. Arias-González.

07-10/07/ 2010

IV Spanish-Portuguese Biophysical Congress, July 7-10 2010, Zaragoza, Spain

Posters

- *Single-molecule characterization of the mechanical properties of dsRNA by means of optical tweezers.* Herrero-Galán, E., Valpuesta, J.M., Carrascosa, J.L., Arias-González, J.R.
- *Tryptophan mutations in hirsutellin A produce a non-cytotoxic but ribonucleolytically active ribotoxin.* Herrero-Galán, E., Lacadena, J., Martínez Del Pozo, A., Olmo, N., Oñaderra, M., Gavilanes, J.G.
- *Condensation prevails over B-A transition of single DNA molecules.* Silvia Hormeño, Fernando Moreno-Herrero, Borja Ibarra, José L. Carrascosa, José María Valpuesta & J. Ricardo Arias-González
- *The Phi29 DNA Polymerase Presents an Active DNA Unwinding Mechanism.* Borja Ibarra, Jose Morin, Jose M. Valpuesta, Margarita Salas, Jose L. Carrascosa
- *Mechanical properties of β–catenin.* A. Valbuena, A.M. Vera, J. Oroz, M. Menéndez, y M. Carrión-Vázquez
- *Testing the mechanical hypothesis in scaffoldins: the effect of natural linkers and cellulase binding.* A. Galera-Prat, A.M. Vera, A. Valbuena, J. Oroz y y M. Carrión-Vázquez
- *Nanomechanics of the tip-link cadherins and its role in hearing.* J. Oroz, A. Valbuena, A. Galera-Prat., R. Hervás, U. Müller, y M. Carrión-Vázquez
- *A mechanical model of the tip-link suggests its role in acoustic mechanotransduction.* A. Gómez-Sicilia, L. Laurene-Martínez, J. Oroz, A. Valbuena y M. Carrión-Vázquez



04-09/07/ 2010

International Conference of Synthetic Metals (ICSM), Kyoto 2010, Japan

Oral communications

- *Picosecond charge evolution in conjugated polymers.* Juan Cabanillas-González, Marta Mróz and Guglielmo Lanzani
- *Real-time study of excitation energy transfer in aggregates of Carbon nanotubes.* L. Lüer, D. Brida, G. Cerullo, J. Crochet, T. Hertel, and G. Lanzani

19-22/07/2010

17th International Conference on Ultrafast Phenomena (UP 2010), Snowmass Village, USA

Oral communication

- *Ultrafast excitation energy transfer in small carbon nanotube aggregates.* L. Lüer, J. Crochet, T. Hertel, G. Cerullo, G. Lanzani

22-26/08/ 2010

240th ACS National Meeting, Boston, USA

Poster

- *Noncovalent chemistry of π-extended tetrathiafulvalene derivatives and fullerenes".* Perez, Emilio M.; Isla, Helena; Gallego, Maria; Martin, Nazario

23-27/08/ 2010

International Vacuum Conference and International Conference on Nanoscience and technology, Beijing, China

Oral communications

- *Electronic and geometric corrugation of periodically rippled, self-nanostructured graphene epitaxially grown on Ru(0001)* S. Barja, B. Borca, M. Garnica, M. Minniti, A. Politano, J.M. Rodriguez-García, J.J. Hinarejos, D. Farías, A.L. Vázquez de Parga and R. Miranda
- *Field emission resonances on periodically rippled graphene.* B. Borca, S. Barja, M. Garnica, D. Sánchez-Portal, S. Silkin, E. Chulkov, F. Hermans, J.J. Hinarejos, A.L. Vázquez de Parga, A. Arnau, P.M. Echenique, R. Miranda
- *Magnetic metal-organic frameworks by means of a versatile 2D molecular self-assembly.* B.Borca, J.M. Rodríguez-García, J.J. Hinarejos, A.L. Vázquez de Parga, R. Miranda
- *Reliable anchoring groups for single-molecule junctions.* M.T. González, E. Leary, C. Evangeli, C. Arroyo, G. Rubio-Bollinger and N. Agraït

23-28/08/ 2010

Joint European Magnetic Symposia JEMS 2010 Krakow, Poland

Oral communications

- *Substrate-induced magnetic anisotropy in $La_{0.7}Sr_{0.3}MnO_3$ epitaxial thin films grown onto (110) and (1-18) $SrTiO_3$ substrates* P. Perna, E. Jiménez, F.J. Teran, L. Mèchin, N. Mikuszeit, J. Camarero and R. Miranda
- *Towards tailoring magnetic properties in exchange-biased system* E. Jiménez, J. Camarero, P. Perna, N. Mikuszeit, F.J. Teran, J. Sort, J. Nogues, J.M. Garcıa-Martın, A. Hoffmann, B. Dieny, and R. Miranda

29-08- 02-09/ 2010

European Conference on Surface Science, Groningen, Netherlands

Oral communications

- *Potential energy landscape for hot electrons in periodically nanostructured grapheme.* M. Garnica, B. Borca, S. Barja, D. Sánchez-Portal, S. Silkin, E. Chulkov, F. Hermans, J.J. Hinarejos, A.L. Vázquez de Parga, A. Arnau, P.M. Echenique, R. Miranda
- *2D molecular self-assembly as a template for magnetic frameworks.* J.M. Rodríguez-García, B.Borca, J.J. Hinarejos, A.L. Vázquez de Parga, R. Miranda

29-08- 02-09/ 2010

DIPC Workshop on Inelastic Transport Phenomena, San Sebastián, Spain

Poster

- *Spatially resolved IETS of epitaxial graphene on Ru(0001)* A Castellanos-Gomez, B Borca, S Barja, M Garnica, AL Vázquez de Parga, R Miranda, G Rubio-Bollinger, N Agrait

12-15/09/ 2010

Joint Meeting Fundamentals of Molecular Electronic Assemblies (FUNMOLS): Mid Term Review and Nanoelectronics: Concepts, Theory and Modelling (Nano-CTM), Malvern, UK FUNMOLS

Oral communication

- *Locating and lifting a single molecular wire.*Edmund Leary, M. Teresa González, Gabino Rubio-Bollinger, Nicolás Agraït, Cornelia Van der Pole, Martin R. Bryce, Salvatore Filippone, Nazario Martin

Poster

- *Contacting single molecules with a scanning tunnelling microscope* Charalambos Evangeli, M. Teresa González, Edmund Leary, Carlos R. Arroyo, Gabino Rubio-Bollinger, and Nicolás Agraït

12- 17/09/ 2010

Joint Meeting Fundamentals of Molecular Electronic Assemblies (FUNMOLS): Mid Term Review and Nanoelectronics: Concepts, Theory and Modelling (Nano-CTM), Malvern, UK

Posters

- *Locating and lifting a single molecular wire* Edmund Leary, M. Teresa González, Gabino Rubio-Bollinger, Nicolás Agraït, Cornelia Van der Pole, Martin R. Bryce, Salvatore Filippone, Nazario Martin
- *Contacting single molecules with a scanning tunnelling microscope* Charalambos Evangeli, M. Teresa González, Edmund Leary, Carlos R. Arroyo, Gabino Rubio-Bollinger, and Nicolás Agraït

13-17/09/ 2010

NANO2010, Rome, Italy

Oral communication

- *Hybrid magnetic superconducting nanostructures* I.K. Schuller, Y.J. Rosen, J. Villegas, D. Perez de Lara, E.M. González and J.L. Vicent

27-29/09/ 2010

Fuerzas y Túnel 2010, Tarragona, Spain

Oral communications

- *2D molecular self-assembly as a template for magnetic frameworks.* J.M. Rodríguez-García, B. Borca, J.J. Hinarejos, A.L. Vázquez de Parga, R. Miranda
- *Field emission resonances on periodically rippled graphene.* M. Garnica, B. Borca, S. Barja, D. Sánchez-Portal, S. Silkin, E. Chulkov, F. Hermans, J.J. Hinarejos, A.L. Vázquez de Parga, A. Arnau, P.M. Echenique, R. Miranda

Poster

- *Electronic and geometric corrugation of periodically rippled graphene epitaxially grown on Ru(0001).* B. Borca, S. Barja, M. Garnica, M. Minniti, A. Politano, J.M. Rodríguez-García, J.J. Hinarejos, D. Farías, A.L. Vázquez de Parga, R. Miranda

28-29/10/ 2010

I Workshop of Computational Photonics, Valencia, Spain

Oral communication

- *DNA polymerase: a catalytic nanomachine with a 2-bit processor.* J.R. Arias-González

14-18/11/ 2010

Magnetism &Magnetic Materials 2010 Atlanta, USA

Oral communication

- *Exploring the limits of soft x-ray magnetic holography:imaging magnetization reversal of buried interfaces.* J. Camarero, E. Jimenez, J. Vogel, C. Tieg, P. Perna, A. Bollero, F. Yakhou-Harris, C. Arm, B. Rodmacq, E. Gautier, S. Auffret, B. Delaup, G. Gaudin, B. Dieny, and R. Miranda

15-17/11/ 2010

Current Trends in Biomedicine. The centrosome: structure, function and dynamics. Baeza, Spain

Poster

- *Single centrosome manipulation reveals its electric charge and associated dynamic structure.* S. Hormeño, B. Ibarra, F.J. Chichón, K. Habermann, B.M.H. Lange, J.M. Valpuesta, J.L. Carrascosa and J.R. Arias-González

19/11/ 2010

Yale Sackler Symposium for Biological, Physicla and Engeneering Sciences. New Haven, CT, USA

Poster

- *Self-assembly of designed proteins into nanostructured films.* Aitziber L. Cortajarena, Tijana Z. Grove, and Lynne Regan

10-12/11/ 2010

NANOLITHO 2010, Oviedo, Spain

Oral communication

- *Kagomé-like array with symmetric pinning centers.* David Perez de Lara, E.M. González, A. Alija, J.I. Martin, M. Velez and J.L.Vicent

10-14/11/ 2010

Workshop Frontiers in interface physics: microfluidics, bimembranes and nanostructures, Benasque, Spain

Poster

- *Modulating self assembly of cytoskeleton proteins on lipid bilayers.* Mario Encinar and Marisela Vélez

14-18/11/ 2010

Magnetism & Magnetic Materials 2010 Atlanta, USA

Oral communications

- *Magnetization reversal in half metallic $La_{0.7}Sr_{0.3}MnO_3$ films grown ontovicinal surfaces.* P. Perna, C. Rodrigo, E. Jiménez, F.J. Teran, L. Mèchin, N.Mikuszeit, J. Camarero and R. Miranda
- *Role of anisotropy configuration in exchange-biased systems.* E. Jiménez, J. Camarero, P. Perna, N. Mikuszeit, F.J. Teran, J. Sort, J. Nogues, J.M. Garcıa-Martın, A. Hoffmann, B. Dieny, and R. Miranda
- *Exploring exchange bias phenomena by soft x-ray spectroscopy and holography.* J. Camarero, E. Jimenez, J. Vogel, C. Tieg, P. Perna, A. Bollero, F. Yakhou-Harris, C. Arm, B. Rodmacq, E. Gautier, S. Auffret, B. Delaup, G. Gaudin, B. Dieny, and R. Miranda

29-11-03-12/ 2010

MRS Fall Meeting 2010 Boston, USA

Oral communication

- *Advanced spectroscopies on novel conducting interfaces* C. Aruta, D. Maccariello, F. Miletto Granozio, P. Perna, M. Riaz, U. Scotti di Uccio, N.B. Brookes, M. Moretti, G. Ghiringhelli, D. Marré, M. Codda, I. Pallecchi, C. Cantoni, J. Gasquez, D. Paparo, L. Marrucci, A. Rubano, M. Fiebig, X. Wang, S. Amoruso, R. Bruzzese

06-10/12/2010

ElecMol10: 5th International Meeting on Molecular Electronics, Grenoble, France

Posters

- *Contacting single molecules with a scanning tunneling microscope*, C. Evangeli, E. Leary, M. T. González, N. Agraït.
- *Effect of the anchoring group on the single-molecule junction formation*, M.T. González , E. Leary, C. Evangeli, C. Arroyo , G. Rubio-Bollinger, N. Agraït.

15-2012//2010

PACIFICHEM: Honolulu, HI, USA

Oral communication

- *Carbon-based compounds for the preparation of efficient photovoltaic devices,* Juan L. Delgado.

4.3. Seminars & lectures

20/12/ 2009

· *Optoelectronic probing of organic based devices.* Juan Cabanillas. University of Nicosia, Cyprus

20/01/ 2010

· *Semiconductor nanostructures for quantum optics and quantum information* Daniel Granados. Instituto de Microelectrónica de Madrid (IMM-CSIC), Madrid, Spain

21-23/01/ 2010

· *Ultrafast energy and charge transfer in optoelectronic materials*. L. Luer First European Symposium on computing pi-conjugated compounds, Institute of Molecular Science (ICMol), University of Valencia, Spain

28 & 29/01/ 2010

· *Concave-convex supramolecular interactions: optimizing electroactive fullerene receptors.* Nazario Martín
  - University of Pierre et Marie Curie, Paris, France 2010
  - University of Angers, Angers, France 2010

14-19/02/ 2010

· XI Escuela Nacional de Materiales Moleculares. Universidad de Valladolid. Peñafiel, Valladolid, Spain
  - *Celulas fotovoltaicas* Juan L. Delgado
  - *Synthetic molecular machines* Emilio Pérez
  - *Fullerenos y otras nanoestructuras de carbono* Nazario Martín

03/03/ 2010 & 13/09/ 2010

· *Unveiling physics in biology by mechanical manipulation of single molecules.* Ricardo Arias
  - Instituto de Cerámica y Vidrio (CSIC), Madrid, Spain
  - CIC-Nanogune, San Sebastián, Spain

18/03/ 2010

· *Fluorination of conjugated organic materials: tuning of ground and excited state properties.* Johannes Gierschner. Institute for Physical & Theoretical Chemistry, University of Tübingen, Germany

24/03/ 2010

· *Impact of fluorination on the structure, optics and photophysics of conjugated materials*. Johannes Gierschner. Department of Materials Science and Engineering, Seoul National University, South Korea

31/03/ 2010

· *3D Energy transfer in weakly coupled supramolecular architectures.* Johannes Gierschner. School of Chemistry, Seoul National University, South Korea

01/04/ 2010

· *Bandgap engineering of conjugated co-polymers by orbital design*. Johannes Gierschner. SKKU Advanced Institute of Nanotechnology, Sungkyunkwan University, Suwon, South Korea

13/05/ 2010

· *Organic optoelectronics: the contribution of ultrafast spectroscopy.* Juan Cabanillas. Universidad Pablo de Olavide de Sevilla, Sevilla, Spain

14/05/ 2010

· *Optical and electronic properties of conjugated organic materials: a lesson from spectroscopy and theory*. Johannes Gierschner. Physics Department, University of Alicante, Spain

19/05/ 2010

· *Quantum optics and quantum information with semiconductor nanostructures: single photon emission, entanglement and strong coupling.* Daniel Granados. Instituto de Ciencia de Materiales de Madrid (ICMM-CSIC), Madrid, Spain

25-26/05/ 2010

- *Fullerenes for organic electronics.* Nazario Martín. International Symposium: Nanomaterials and Functionality, Valencia, Spain

22/06/ 2010

- *Bandgap engineering of conjugated co-polymers by orbital design.* Johannes Gierschner. Laboratory for Chemistry of Novel Materials, University of Mons, Belgium

24/06/ 2010

- *Electronic, optical & photophsyical properties of conjugated organic materials: at the crossroad of spectroscopy and theory.* Johannes Gierschner. Unité Physico-Chimie et de Physique des Matériaux (PCPM), Université Catholique de Louvain, Belgium
- *Heteroleptic Ir-complex Dyads: Following the Deactivation Pathway.* Johannes Gierschner. Department of Materials Science and Engineering, Seoul National University, South Korea

16/07/ 2010

- III Escuela de Verano sobre Historia de la Química. UR2010. Átomos y Moléculas en congreso. 150 años después del Congreso de Karlsrutle. Logroño, Spain
  - *Una historia de la Química actual: las nanoformas del carbono.* Nazario Martin

19-23/07/ 2010

- Universidad Complutense de Madrid. Summer Courses 2010. Nanociencia y su Impacto Social. El Escorial, Spain
  - *Introducción a la Nanociencia Molecular.* Nazario Martín.
  - *Transporte electrónico a través de moléculas individuals.* Nicolas Agrait
  - *Grafeno epitaxial: un nuevo nanomaterial.* Rodolfo Miranda Soriano
  - *Nanociencia a través de la imagen: las nuevas herramientas.* Mesa redonda. Rodolfo Miranda Soriano, Nazario Martín & Nicolas Agrait

20/09/ 2010

- *Nanotechnology and nanoscience: from IFW to IMDEA Nanociencia.* IFW-Dresden. Institute of Metallic Materials, Dresden, Germany. Alberto Bollero

12/10/ 2010

- *Structural polymorphism of FtsZ polymers formed on different surfaces.* Marisela Vélez. Mesa Institute of Nanothechnology, Enschede, Netherlands

24-29/10/ 2010

- *Fullerenes organic electronics.* Nazario Martín III European School on Molecular Nanoscience. EsMolNa, Miraflores de la Sierra, Madrid

01/11/ 2010

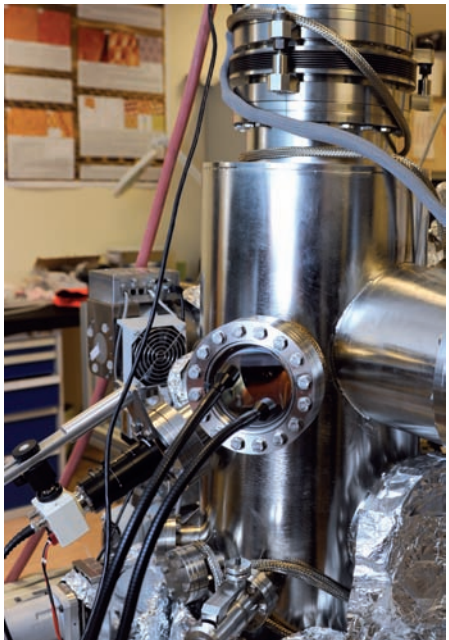
- *Single molecule junctions: inelastic spectroscopy and transport.* N. Agraït, Department of Physics Basel University

09/11/ 2010

- *Modulating self assembly of cytoskeleton proteins on lipid bilayers.* Marisela Velez. Universidad de Barcelona, Spain

17/11/ 2010

- *Structural polymorphism of FtsZ polymers formed on different.* Marisela Velez. (Instituto de Microelectrónica. Tres Cantos, Madrid)



4.4. Seminars at imdea nanociencia

22/01/ 2010

- *Observing angular deviations in the specular reflection of a light beam*
  Dr. Michele Merano Huygens Laboratory, Leiden University, The Netherlands
- *Theoretical studies in the nanometer and femtosecond scales*
  Dr. Annapaola Migani Departament de Química Física and Institut de Química Teòrica i Computacional (IQTCUB), Universitat de Barcelona, Barcelona, Spain

26/01/ 2010

- *Exchange coupling and magnetization dynamics in thin magnetic films studied by photoemission electron spectromicroscopy*
  Dr. Jorge Miguel, Institut für Experimentalphysik, Freie Universität Berlin, Arnimallee, Berlin, Germany

01/02/ 2010

- *DFT-based approaches to the geometry, reactivity and STM/STS imaging of nanostructured surfaces*
  Dr. Gilberto Teobaldi The Institute of Scientific and Industrial Research (ISIR), Osaka University, JAPAN & Department of Physics and Astronomy, University College London, London, UK

05/02/ 2010

- *Spintronics with single molecules and atoms*
  Prof. J.P. Bucher Institut de Physique et de Chimie des Matériaux de Strasbourg, UMR 7504, Université de Strasbourg, 67034 Strasbourg, France

08/02/ 2010

- *Novel effects in magnetism, spintronics and photonics of molecular nanomaterials*
  Dr. Alessandro Soncini, Institute for Nanoscale Physics And Chemistry (INPAC), Chemistry Department, Katholieke Universiteit Leuven, Belgium
- *Friction control and particle manipulation on the nanoscale: a ten-year summary*
  Dr. Enrico Gnecco, National Center of Competence in Research "Nanoscale Science", Department of Physics - University of Basel, Switzerland

19/02/ 2010

- *Fluorescent organic nanowires: supramolecular assembly, enhanced emission, charge transfer, and switching*
  Prof. Dr. Soo Young, Park Department of Material Science and Engineering Seoul National University, South Korea

22/02/ 2010

- *Design of new materials based on carbon nanostructures and overcrowded polycycles*
  Dr. Fulvio G. Brunetti, Center for Polymers and Organic Solids University of California, Santa Barbara

23/02/ 2010

- *Nanomagnets for future ultrahigh density magnetic recording media*
  Dr. Luo Feng, College of Engineering, Peking University, Beijing, China

05/03/ 2010

- *How the local environment affects the Kondo screening of a high-spin atom*
  Dr. Cyrus F. Hirjibehedin, London Centre for Nanotechnology Department of Physics & Astronomy Department of Chemistry UCL
- *Nano- and micro-structuring of plastics for organic lasers and solar cell applications*
  Dr. Mariano Campoy Quiles, Nanostructured Materials Group, Institute of Material Science of Barcelona (ICMAB-CSIC)

at imdea nanociencia · seminars ·

15/03/ 2010

· *Matter modification by ultrafast lasers: from atoms to optical chips*
Dr. Jovana Petrovic, European Laboratory for Non-Linear Spectroscopy LENS, Florence, Italy

· *Super-resolution fluorescence imaging of DNA topology*
Dr. Cristina Flors, School of Chemistry and Collaborative Optical Spectroscopy Micromanipulation & Imaging Centre (COSMIC) University of Edinburgh, UK

23/03/ 2010

· *Organic thin films: structure, physical properties, and applications*
Corneliu N. Colesniuc, M.S Physics Department, University of California, San Diego, USA

16/04/ 2010

· *Photoinduced energy and charge transfer in conjugated polymers*
Dr. Aránzazu Aguirre, Molecular Materials and Nanosystems Eindhoven, University of Technology, Eindhoven The Netherlands

20/04/ 2010

· *Espectroscopía e interferencia cuántica en un átomo artificial*
Dr. Sergio O. Valenzuela, ICREA y Centre d'Investigació en Nanociencia i Nanotecnologia (ICN-CSIC), Barcelona, España

12/05/ 2010

· *Manipulating magnetization reversal mechanisms of nanostructures with perpendicular anisotropy*
Dr. Kai Liu, Physics Department, University of California – Davis, USA

17/05/ 2010

· *Electron transport through single molecules studied with a scanning tunneling microscope*
Dr. Wolfgang Haiss, University of Liverpool, Department of Chemistry and Liverpool Institute for Nanoscale Science, Engeneering and Technology (LINSET)

28/05/ 2010

· *Hybrid semiconductor structures based on combinations of light-emitting polymers and iii-nitrides*
Dr. Grigorios Itskos, Department of Physics, University of Cyprus, Cyprus

26/06/ 2010

· *Micro and nanofabrication of polymer based functional devices*
Dr. Isabel Rodríguez, Institute of Materials Research and Engineering (IMRE) - Agency for Science, Technology and Research (A*STAR). Singapore

09/07/ 2010

· *Electronically nonadiabatic chemical dynamics at metal surfaces*
Prof. Alec M. Wodtke, Georg-August University of Göttingen and the Max Planck Institute for BiophysicalChemistry, Göttingen, Germany

12/07/ 2010

· *Forma y función de nanoestructuras de carbono. Prof. Humberto Terrones*
Profesor Visitante del Instituto de Materia Condensada y Nanociencias de la Universidad Católica de Lovaina, Bélgica

17/09/ 2010

· *Mechanostability of proteins and virus capsids*
Prof. Dr. Marek Cieplak Institute of Physics, Polish Academy of Science, Warszawa, Poland

07/10/ 2010

· *Methodology for searching new superconductors: the La-Si-C system*
Dr. José de la Venta, Physics Department University of California-San Diego, La Jolla, California, USA

22/10/ 2010

· *Unimolecular electronics*
Prof. Robert M. Metzger, Department of Chemistry, The University of Alabama, Tuscaloosa, USA

29/10/ 2010

· *Graphene on metal surfaces - binding, structure, and growth*
Prof. Dr. Joost Wintterlin, Department Chemie and CeNS, University of Munich, Germany

11/11/ 2010

· *Synthesis of Ru nanoparticles in ionic liquids. Applications in catalysis*
Dr. Gorka Salas Hernández, Laboratoire de Chimie OrganoMétallique de Surface, 69616 Villeurbanne CEDEX FRANCE

12/11/ 2010

· *Nanotribology studies with Atomic Force Microscopy: From atomic membranes to atomic-scale wear*
Prof. Robert W. Carpick, Department of Mechanical Engineering and Applied Mechanics, University of Pennsylvania, USA

16/11/ 2010

· *The dynamics of photoinduced electron transfer processes in porphyrin-fullerene interlocked systems*
Prof. David I. Schuster, Department of Chemistry, New York University, USA

26/11/ 2010

· *Kondo effect and electric field gating in single organic molecules*
Dr. Katharina Franke, Dept. of Physics, Freie Universität Berlin, Germany

4.5. Scientific outreach activities

4.5.1. Talks

19/01/ 2010

Nanociencia: lo importante de lo pequeño. Nazario Martín. Universidad de Huelva. Huelva, Spain

25/02/ 2010

Exciton coupling and transport in conjugated organic materials. Johannes Gierschner. Nanomatch Workshop, University of Tübingen, Germany

26/02/ 2010

Nanotechnology. Edmund Leary. Los jueves de la ciencia, Univ. Nacional de Educación a Distancia, Guadalajara, Spain

01/04/ 2010

Procesos biológicos en superficies a escala nanométrica: primeras etapas de la división bacteriana. Marisela Vélez. Instituto de Química Física "Rocasolano" (CSIC), Madrid, Spain

15-16/04/ 2010

The risks of nanoscience and nanotechnology. Ricardo Arias. I Spanish National Congress on the New Technologies and their consequences for security: Internet, Biotechnology and Nanotecnology. MAPFRE Foundation, Madrid. Spain

16/04/ 2010

Biofísica de centrosomas y ADN mediante manipulación óptica. Silvia Hormeño. ICMM, Madrid, Spain

12 & 19/05/ 2010

Nanociencia y Nanotecnología: un viaje al futuro desde lo pequeño. Elías Herrero I.E.S. "Jaime Ferrán" de Collado Villalba. Spain

21/05/ 2010

Seminarios-Café Instituto Nicolás Cabrera, Universidad Autónoma de Madrid. Spain

- *Pinzas ópticas para el análisis de moléculas individuales: una nueva visión de la replicación del DNA.* Borja Ibarra
- *Unveiling physics in biology by mechanical manipulation of single molecules.* Ricardo Arias

20/06/ 2010

Ultrafast dynamics of optoelectronic material. L. Lüer. Tutorial. Summer School of the BIMORE Network, Billund, Denmark

14/07/ 2010

Organic photovoltaics: a chemical approach. Nazario Martin. Instituto Catalán de Investigación Química ICIQ, Tarragona, Spain

10/08/2010

La formación universitaria fuera de las aulas: nuevas ideas y oportunidades. La organización y la Gestión. Francisco Terán.Universidad Internacional Menéndez Pelayo UIMP, Santander, Spain

17/08/ 2010

La calidad de la investigación en las diferentes áreas científicas. Rodolfo Miranda. Escuela "Blas Cabrera" de Introducción a la investigación, la docencia y la innovación. Universidad Internacional Menéndez Pelayo UIMP, Santander, Spain

17/09/ 2010

Preparing a MultiFun proposal. Francisco Terán. Info day about NMP-2011 Calls in the VII Frame Program, Headquarters of Centro para el Desarrollo Tecnológico e Industrial, Madrid, Spain

28/09/ 2010

Periodically rippled epitaxial graphene: an electronically and structurally nanostructured material. Rodolfo Miranda. PASSION FOR KNOWLEDGE, CIC Nanogune, San Sebastián, Spain

07/10/ 2010

Defensa y Nanotecnología. Rodolfo Miranda, Ciclo de Conferencias del Ministerio de Defensa en la Universidad Autónoma de Madrid, Madrid, Spain

19/10/ 2010

Interacciones Supramoleculares cóncavo-convexo. Nazario Martín. XIV Semana Científica Antonio González. Universidad de la Laguna, Tenerife, Spain

15/10/ 2010

Practical Aspects of Optical Spectroscopy. Johannes Gierschner. Tutorial. Department of Materials Science and Engineering, Seoul National University, South Korea

22/10/ 2010

Aspects of UV/Vis Spectroscopy: Light scattering, Polarized and Time-resolved Fluorescence. Johannes Gierschner. Tutorial. Department of Materials Science and Engineering, Seoul National University, South Korea

19/10/ 2010

The B-A transition in DNA: a study at the single-molecule level. Ricardo Arias. Universidad de Barcelona, Spain

Nanociencia: La importancia de lo pequeño. Nazario Martín

11/11/ 2010 Universidad San Pablo CEU, Madrid, Spain

16/11/ 2010 Universidad de Alicante, Spain

19/11/ 2010 Universidad de Zaragoza, Spain

talks

4.5.2. Outreaching activities

madrimasd

29/03/2010
¡A formar!
Roberto Otero. madri+d
http://www.madrimasd.org/informacionidi/noticias/noticia.asp?id=43288&origen=Home_InfoIDI

24/04/ 2010
ADN, mucho más que material genético
Álvaro Somoza. madri+d
http://www.madrimasd.org/informacionIdi/analisis/analisis.asp?id=43551

31/05/ 2010
Oligonucleótidos modificados para controlar los genes
Álvaro Somoza. madri+d
http://www.madrimasd.org/informacionidi/noticias/Imprimir_noticia.asp?id=44158&sec

30/07/ 2010
Nanotecnología: Moléculas orgánicas llaman al orden a nanocristales inorgánicos
Beatriz Hernández
http://www.madrimasd.org/informacionIDI/noticias/noticia.asp?id=44901

23/09/2010
Por qué soy científico
Rodolfo Miranda
http://www.madrimasd.org/informacionIDI/noticias/noticia.asp?id=45450

29/11/2010
Del reconocimiento molecular al autoensamblaje. Nuevos materiales para células solares orgánicas
Emilio Pérez
http://www.madrimasd.org/informacionidi/noticias/ noticia.asp?id=46334

14/12/2010
Premios Nobel 2010. La satisfacción interior
Rodolfo Miranda
http://www.madrimasd.org/informacionIdi/analisis/analisis.asp?id=46517

Press

07/2010
La Fundación (Mapfre)
Inteview Ricardo Arias
http://revistalafundacion.es/lafundacion10

13/10/2010
El País

Un "experimento del viernes"
Rodolfo Miranda
http://www.elpais.com/articulo/futuro/experimento/viernes/elpepusocfut/20101013elpepifut_3/Tes

Ladrillos moleculares
Nazario Martín
http://www.elpais.com/articulo/futuro/Ladrillos/moleculares/elpepusocfut/20101013elpepifut_1/Tes

outreaching activities

Radio

10/06/2010
RNE Radio 5 ENTRE PROBETAS
Richard Feyman
http://www.rtve.es/podcast/radio-5/entre-probetas/

05/11/2010
SER "A vivir"
Inteview Rodolfo Miranda

TV

26/01/2010
tve A Fondo Canal 24h
Inteview Rodolfo Miranda & Nazario Martín

27/02/2010 & 10/04/2010
Telemadrid En pleno Madrid
Inteview Rodolfo Miranda

22/07/2010
TVE La Aventura del Saber
Inteview Nicolás Agraït

Sponsorships

15/06/ 2010
Ciencia y Sugerencia. Awards 2010
http://www.cienciaysugerencia.es/

4.6. Workshops & courses (Co)-Organized by Imdea-Nanociencia

23-21/01/ 2010
Organization of the 1st European Symposium on *Computing πConjugated Compounds* (CΠC), Valencia, Spain

25-26/02/ 2010
Organization of the NANOMATCH Workshop on *Optical Spectroscopy and Microscopy* Tübingen, Germany

06-11/06/ 2010
Co-organization of the European Spring School 2010 on *Supramolecular Organized Nanostructured Materials for Optoelectronic Applications*, Alghero, Italy

19-23/07/ 2010
Organization of the course *Nanociencia y su Impacto Social*. Universidad Complutense de Madrid Summer Courses 2010. El Escorial, Spain

19-24/07/2010
Co-organization of *Physical Chemistry of Biointerfaces Workshop,* CIC biomaGUNE, San Sebastián, Spain

27-29/09/ 2010
Co-organization of *Fuerzas y Túnel* 2010, Tarragona, Spain

22-29/10/ 2010
Co-organization of the *III European School 2010 on Molecular Nanoscience,* Miraflores de la Sierra, Madrid, Spain

11 & 17 /11/ 2010
Contributions to *X Semana de la Ciencia.* Madrid, Spain. IMDEA-Nanociencia guided tour for high schools
· Conferences.
- *Nanociencia y Nanotecnología: grandes ideas para mundos pequeños.* Adriana Martín
- *Highly efficient organic photovoltaic cells: the nanostructure is the key.* Larry Luer

4.7. Institutional activities

Participation in the UAM+CSIC International Campus of Excellence

13/01/ 2010
Placement of the foundation stone of the building of the Madrid Institute for Advanced Studies in Nanoscience (IMDEA Nanociencia)

01/02/ 2010
Marie Curie Actions: Inspiring Researchers and IMDEA Nanociencia Institute
http://ec.europa.eu/research/mariecurieactions/docs/inspiring_researchers_en.pdf

03/ 2010
Incorporation to the Network of Research Laboratories of *Comunidad de Madrid* (REDLAB)

22-23/02/ 2010
Participation in the *Plataforma Española de Nanomedicina* Meeting, organized by Nanomed-UII. Barcelona, Spain

04/05/ 2010
Participation in the *Nanomedicine Partnering Day Meeting*, organized by Nanomed-UII. Barcelona, Spain

01/06/2010
Collaboration in the French Alternative Energies and Atomic Energy Commission (CEA), Technical Visits. Madrid, Spain.

30/06/201
Collaboration with madri+d in "INFO Day. FP7 PEOPLE PROGRAME". Madrid, Spain

24/09/2010
Participation in "La noche de los investigadores. Por qué soy científico". Madrid, Spain

15/11/2010
Collaboration with madri+d in "INFO Day. HACIA EL OCTAVO PROGRAMA MARCO. *La visión de los agentes del sistema regional de I+D sobre el 8PM".* Rodolfo Miranda. Madrid, Spain

18/11/2010
Incorporation to the EURAXESS Services Local Contact Point. IMDEA Nanociencia. Madrid, Spain

institutional activities

4.8. Academic activities

4.8.1. Participation in

- Interuniversity Master's Degree in Molecular Nanoscience and Nanotechnology[1]
- Interuniversity Master's Degree in Condensed Matter Physics and Nanotechnology[2]
- Master's Degree in Biophysics[3]
- Master's Degree in Nanotechnology[4]
- Doctoral Program in Protein Structure and Function[5]
- Doctoral Program in Molecular and Cell Biology[6]

4.8.2. PhD Thesis

- February 26, 2010**.** *An experimental study of H_2 diffraction from metal surfaces***.** Pablo Nieto, Universidad Autónoma de Madrid. Advisors: Rodolfo Miranda and Daniel Farías
- May 5, 2010 *Biophysics of centrosomes and DNA studied by optical manipulation.* Silvia Hormeño Torres, Universidad Autónoma de Madrid. Advisors: Ricardo Arias and Jose Mª Valpuesta
- May 21, 2010 *La nanomecánica de proteínas en enfermedades humanas: sordera hereditaria y parkinson.* Javier Oroz Garde. Advisor: Mariano Carrión
- December 17, 2010 *Nanoscale Ordering of Coordination Compound and Networks at Solid Surfaces.* Marta Trelka. Advisors: Dr. Roberto Otero y Dr. José María Gallego

4.8.3. Master

- May 28, 2010**,** *Estudio mediante Microscopía y Espectroscopía Túnel de Barrido de TCNQ sobre grafeno nanoestructurado.* Manuela Garnica. Universidad Autónoma de Madrid. Advisor: Amadeo L. Vázquez de Parga
- May 28, 2010, *SPM investigation on hybrid CNT- QD system.* Fabiola Iacono. Universidad Autónoma de Madrid. Advisors: Beatriz Hernández and Roberto Otero

4.8.3. Internships

- 1 June - 31 August & 20 September - 20 December , Al Taleb Amjad. *Dynamical properties of graphene on Ru(0001).* Istituto Universitario di Studi Superiori di Pavia, Italy
- 1 June - 31 August, Prashant Verma. *Electron transfer through single molecules.* Indian Institute of Technology, Kharagpur
- 20 September - 20 December, Ramón Bernardo Gavito. *An introduction to scanning nearfield optical microscopy (SNOM).* Universidad Complutense de Madrid
- 20 September - 20 December, Javier López Andarías. *Organización jerarquizada de nanoestructuras a partir de bloques de construcción opto-electrónicos.* Universidad de Castilla la Mancha
- 20 September - 20 December, Leonor De La Cueva Castillo. *Electrochemical studies of quantum-dots decorating carbon nanotubes.* Universidad Complutense de Madrid
- 20 September - 20 December, Alberto Sanz de León. *Preparación de superficies poliméricas con aplicación en la elaboración de sensores.* Universidad de Sevilla

[1] Organized by the Universities of Alicante, Valencia, Valladolid y Autónoma de Madrid, in Spain
[2] Organized by the Universities Autónoma de Madrid, Oviedo and Murcia, in Spain
[3] Organized by the Universidad Autónoma de Madrid, Spain
[4] Organized by Aliter –International Business School, Madrid, Spain
[5] Organized by the Universities of Zaragoza, Sevilla, Autónoma de Barcelona and the Consejo Superior de Investigaciones Científicas (CSIC), in Spain
[6] Organized by the Universidad Autónoma de Madrid, Spain

4.9. Projects & fellowships

4.9.1. Projects

1. **Dr. Johannes Gierschner**. Marie Curie Research Training Network. *NANOMATCH: Supramolecular nanostructured organic / inorganic hybrid systems* MRTN-CT-2006-035884. (Coordination) www.nanomatch.eu

2. **Dr. Larry Luer**, Marie Curie Research Training Network *BIMORE: Bio-inspired approaches molecular (opto)electronics* (Coordination) http://www.bimore.eu

3. **Dr. Beatriz Hernández**. Marie Curie Actions. European Re-integration Grants (ERG). FP7-PEOPLE-2009-RG *DOTUBE: Interactions between semiconductor nanoparticles and carbon nanotubes.* nº 239256

4. **Dr. Aitziber López-Cortajarena**. Marie Curie Actions. International Re-integration Grants (IRG). FP7-PEOPLE-2009-RG *BIONANOTOOLS: Protein design to generate bio-functional nanostructures.* nº 246688

5. **Prof. R. Miranda and Dr. Julio Camarero.** Marie Curie Actions. International Research Staff Exchange. FP7-PEOPLE-2009-IRSES. *ONDA: Ordered hetero- and Nano-structures with Epitaxial Dielectrics for magnetic and electronics Applications.* nº 247518

6. **Dr. Beatriz Hernández and Dr. Roberto Otero.** Ministerio de Ciencia e Innovación. Subprograma MAT. "*Growth and characterization of new nanomaterials based on self-assembled quantum dots and carbon nanotubes on solid surfaces*". MAT2009-13488

7. **Dr. Aitziber López-Cortajarena, Dr. Álvaro Somoza and Dr. Francisco Terán** FP7-NMP-2010-LARGE-4. *MULTIFUn:* MultiFunctional Nanotechnology for Selective Detection and Treatment of Cancer. *MULTIFUn.* nº 262943-2

8. **Prof. Fernando Martín**. European Science Foundation. COST Action. *Chemistry with Ultrashorts Pulses and Free-Electron Lasers: looking for control strategies through *exact* computations. CM0702-1*

9. **Dr. Juan Cabanillas.** Ministerio de Ciencia e Innovación. Subprograma TEC. *Amplificadores ópticos basados en polímeros conjugados para sensores químicos.* TEC2010-21830-C02-02

10. **Dr. Álvaro Somoza.** Ministerio de Ciencia e Innovación. Subprograma SAF2010-15440. *"Oligonucleótidos modificados en Medicina: Detección de secuencias de ácidos nucleicos e inhibición de la expresión génica mediante ARN interferente".* Dr. Somoza also participates in CSIC/NSC "FORMOSA PROGRAM" COOPERATIVE RESEARCH PROJECTS (CRPs). *Characterization Of Novel Drug Delivery Systems* 2009TW0031

11. **Dr. Francisco Terán.** Ministerio de Ciencia e Innovación. Subprograma MAT. *Optimisation of functional NANOparticles as a novel, minimal-invasive and efficient therapy for targeting Cancer Stem Cell (NANOvsCSC).* MAT2010-21822-C02-01

12. **Dr. Mariano Carrión.** Ministerio de Ciencia e Innovación. Subprograma BIO. *Nanomecánica del Sistema Cadherina: Cadherinas Sinapticas y Auditivas.* BIO2010-22275

13. **Dr. Emilio Pérez.** *Mechanically interlocked carbon nanotubes (MINT).* European Theoretical Spectroscopy Facility. 10.000 hours calculation time

14. **Dr. Teresa González.** Participates in Ministerio de Ciencia e Innovación. Subprograma MAT. *Transporte eléctrico a través de moléculas individuales y nanocintas de grafeno.* MAT2008-01735.

15. **Dr. Juan Luis Delgado and Dr. Emilio Pérez.** Participate in Ministerio de Ciencia e Innovación *"Acción de Coordinación España-Japón. Fullerenos endoédricos químicamente modificados para aplicaciones fotovoltáicas (FullSol@r).* PLE-2009-0168.

16. **IMDEA Nanociencia**. Marie Curie Action. FP7-PEOPLE-2007-2-3-COFUND Co-funding of Regional, National and International Programmes. *AMAROUT.* nº 229599

17. **IMDEA Nanociencia**. Convocatoria de Ayudas para la realización de Programas de Actividades de I+D entre grupos de investigación de la Comunidad de Madrid

a S2009/MAT-1726 *NANOBIOMAGNET: fundamentos y aplicaciones de moléculas, nanopartículas y nanoestructuras magnéticas: de la espintrónica a la biomedicina*. Coordination: Rodolfo Miranda

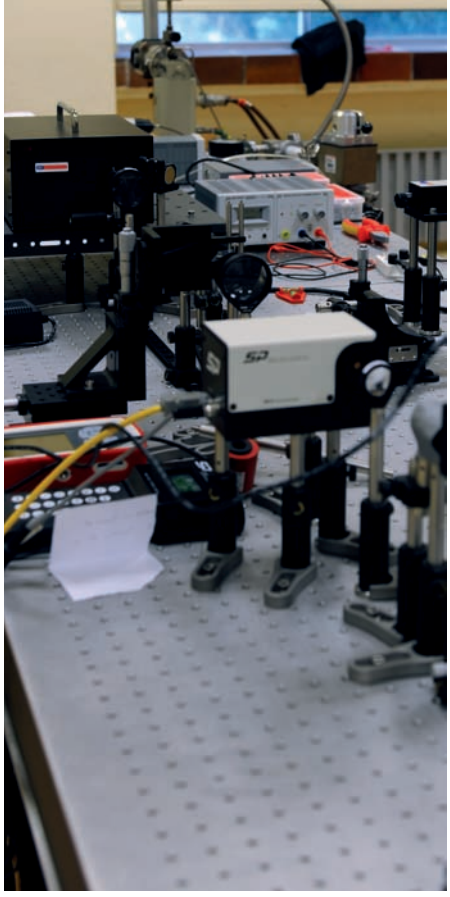
b S2009/PPQ-1553. *Materiales foto y electroactivos para células solares orgánicas e híbridas MadriSolar2.* Coordination: Nazario Martín

c Marisela Velez and Mariano Carrion participate in S2009MAT-1507 *NOBIMAT-M. Nuevos materiales y dispositivos biofuncionales híbridos en Nanociencia.* Coordination: J. López Carrascosa

18. **Julio Camarero invited researcher at:**

a Sincrotron ESRF, beamline ID8 Grenoble, Francia April 2010 2 weeks
Experiment HE 3270: *Investigation of the magnetisation reversal and the uncompensated moments in perpendicular exchange bias systems by soft x-ray holography*

b Sincrotron Soleil, beamline ID8 Grenoble, Francia May 2010 2 weeks
Experiment HE 3273 (ESRF) N° 20090726 (Soleil): *Influence of Oersted fields on current-induced domain wall motion studied by time-resolved XMCD-PEEM*



4.9.2. Fellowships

- *Marie Curie AMAROUT* European Union, 2010.
  - Incoming Fellowships: **Paolo Perna, Larry Luer and David Canevet, Enrico Gnecco, Feng Luo**
  - Reintegration Fellowships: **Aitziber Lopez-Cortajarena**

- *Incentive for the Incorporation and Intensification of Research Activity (I3) Fellowships,* Spanish Ministry of Science and Innovation, 2009, **Dr. Mariano Carrión**

- *José Castillejo* Programme. Mobility Grant. Spanish Ministry of Education. 2010. **Dr. Aitziber Lopez-Cortajarena**

- FPU Programme. Predoctoral Grant.Spanish Ministry of Education. 2010. **Adriana Martín**

4.10. External contracts

external contracts

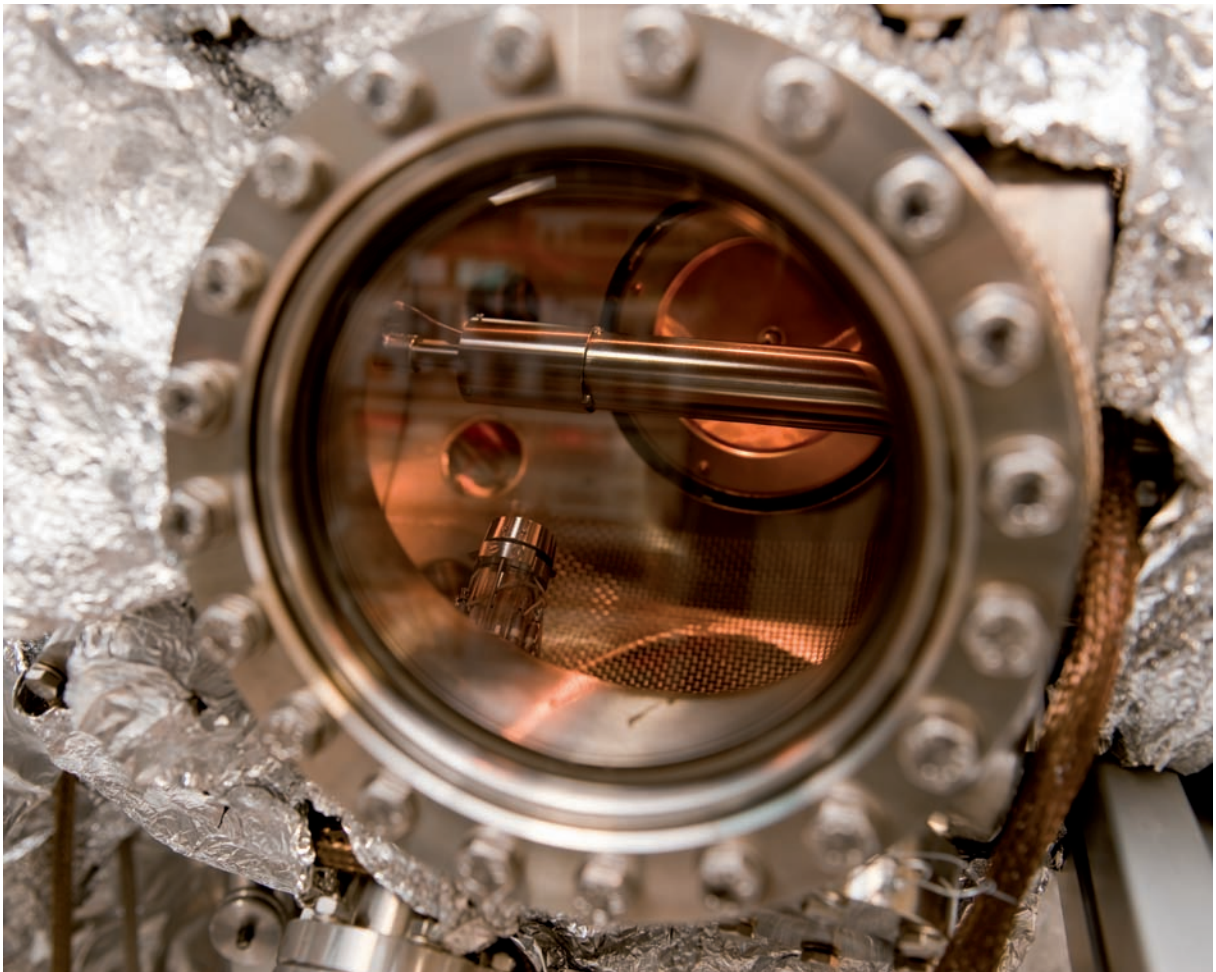
With AERnnova AEROSPACE S.A. **http://www.aernnova.com.** Ministerio de Industria, Turismo y Comercio. Proyecto CENIT. *Innovation in Advanced Composites and Rear-End Optimized (ICARO)*. 4 years contract (2008-2011)

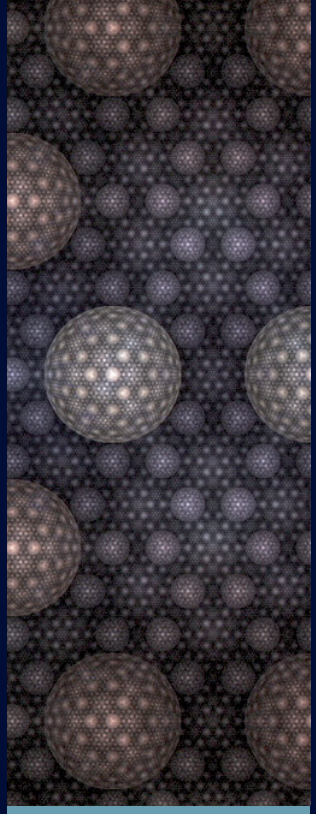
4.11. Honors

honors

Prof. Fernando Martín *Real Sociedad Española de Química* Prize 2010

Dr. Emilio Pérez. Joven 2010 Science and Technology Prize. Universidad Complutense de Madrid





5 research focus: graphene

5.1. Graphene: The Wonder Nanomaterial

Graphene was brought into scientific and technological spotlight by an accidental discovery carried out in a dark laboratory in Manchester: ultrathin flakes of graphite, consisting of few uncoupled planes of graphene, unexpectedly display the extraordinary transport properties predicted for a strictly two dimensional layer of C atoms with a herringbone arrangement of atoms.

Time and again a single discovery generates a scientific and technological revolution. Graphene is the last case, an example that has deserved the Nobel Prize for Physics in 2010 to André Geim and Kostya Novoselov, who discovered it on a dark Friday afternoon in Manchester in 2004 and started a gold rush all over the world.

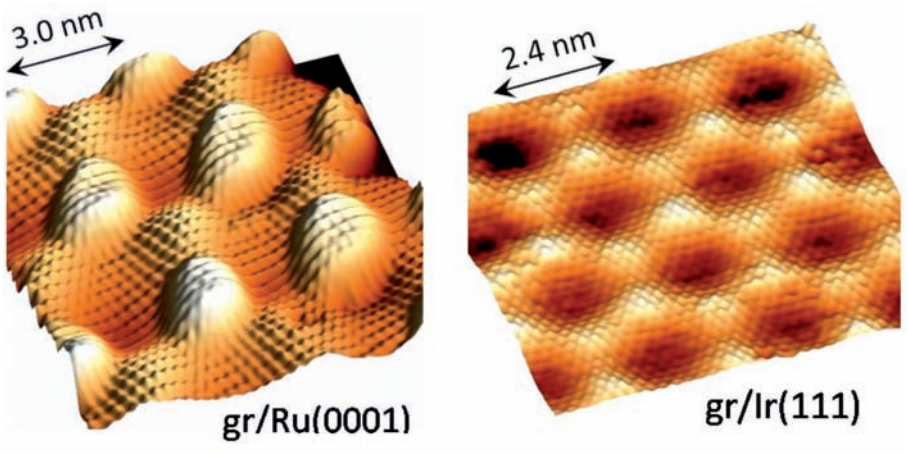
In the short period of time since its discovery, researchers have found that the properties of graphene are truly extraordinary. Graphene is the realization of the ultimate nanomaterial. It is just a single atom thick. All its atoms, therefore, are at the surface. And the surface is a weird world indeed.

Charge carriers show a mobility much higher in graphene than in any other material. Ballistic transport (i.e. without collisions) of both charge and spin has been observed for thousand of nanometers. Both characteristics have been already exploited in high-speed analog transistors. The current densities in graphene are 1 million times larger than in copper, although this property has not been utilized for practical applications yet.

The mechanical properties of graphene are simply amazing. It has a strength 20 times larger than steel, still it can be elastically stretched more than 20%. Being hard and flexible, important applications of graphene in strong, light-weight nanocomposite materials for aerospace applications are feasible.

Graphene is 97% transparent to visible light, yet electrically conductive, which makes it an excellent candidate to replace present materials as transparent electrodes in touch screens and solar cells.

The production of graphene for most of these applications by mechanical exfoliation, however, is a lengthy, costly and non-scalable procedure. It was essential to find out practical methods to grow laterally extended single layers of graphene with enough structural perfection. Research carried out at IMDEA Nanociencia has played a recognized role in the seminal discovery of a method to grow epitaxial single layers of graphene by Chemical Vapor Deposition on many metal surfaces [1-3]. The method, reported in 2008, has yielded centimeter wide, periodically rippled monolayers of graphene, where many basic properties have been discovered [4-8] since, and many potential applications are presently envisaged in labs worldwide.



Graphene has another aspect, also pioneered at IMDEA Nanociencia, namely, it constitutes a perfect, inert substrate to explore one of the biggest scientific challenges: understanding the self-organization of organic matter to generate complex, functional structures. To this end, the self-assembled structures spontaneously produced by organic molecules deposited on graphene can be studied with unprecedented detail and control [9], something that might also be relevant for applications in organic solar cells and a variety of molecular sensors.

References to some work on graphene carried out at IMDEA Nanociencia.

[1] A.L. Vázquez de Parga *et al,* *Phys. Rev. Lett.* **100,** 056807 (2008)
[2] A. L. Vázquez de Parga *et al,* *Phys. Rev. Lett.* **101,** 099704 (2008)
[3] R. Miranda and A. L. Vázquez de Parga, *Nature Nanotech.* **4,** 549 (2009)
[4] B. Borca *et al,* *Semiconductor Science and Technology* **25** (3) 034001 (2010)
[5] B. Borca *et al,* *J. Phys.: Condens. Matter* **21,** 134002 (2009)
[6] B. Borca *et al,* *N. Journ. Phys.* **12,** 093018 (2010)
[7] B. Borca *et al,* *Phys. Rev. Lett.* **105,** 036804 (2010)
[8] B. Borca *et al,* *Phys. Rev. Lett.* **105,** 219702 (2010)
[9] S. Barja *et al,* *Chem Comm.* **46,** 8198 (2010)

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graphic design
base 12 diseño y comunicación

photography
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josé luis fernández: p.13, p.15, p.16, p.19, p.23, p.26, p.29, p.31, p.34 and p.35

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