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CONVOCATORIA 2014

Turno de acceso general

Nombre: **GARCIA DE OTEYZA FELDERMANN, DIMAS**
Referencia: RYC-2014-14974
Área Científica: Ciencia y Tecnología de Materiales
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Título:

Physical chemistry phenomena in organic materials

Resumen de la Memoria:

Overall, the research throughout my career has been mainly devoted to the investigation of physical chemistry phenomena in organic materials and organic-inorganic interfaces. Initially, during my PhD, my investigations in Prof. Dosch's department at the Max-Planck Institute for Metals Research were mainly focused on the growth and structure of organic semiconducting thin films, combining X-ray diffraction studies with complementary scanning probe microscopy measurements.

In the following postdoc, at Prof. Ortega's Nanophysics Lab of the Donostia International Physics Center (DIPC, San Sebastian, Spain), I set up a new research line within the group. The group's main research focus being the characterization of the electronic properties of surface structures by photoemission and X-ray absorption spectroscopies, I started pursuing this type of analysis on the crystalline molecular blends on metal surfaces studied during my PhD. Later on, I extended the same kind of studies to closely related but systematically varied systems, including different molecular combinations and a variety of substrates. On this topic, I was given the opportunity to plan and supervise the master and subsequent PhD theses of two students. Throughout this postdoc I additionally collaborated with the Polymers and Soft-Matter group of the DIPC applying my knowledge on scanning probe microscopies to characterize polymer properties with nanometric resolution by electric force microscopy.

Then I joined the Molecular Foundry of the Lawrence Berkeley National Laboratory (LBNL) in California as a postdoc to study new optical development methods of lithographic resists based on small organic molecules. Laser-assisted development of high-resolution e-beam lithographic patterns led to improved resolution down to sub-20-nm half-pitch patterns. However, the key of this project was the understanding of the underlying chemistry, which we obtained mainly based on Raman and infrared spectroscopies.

After that I joined Michael Crommie's group at the University of California at Berkeley. The main research focus was the study of graphene nanoribbons (GNRs) by low temperature scanning probe microscopy. This included GNRs obtained from unzipped carbon nanotubes and, more importantly, from molecular precursors undergoing surface-supported chemistry. This last approach is particularly promising because it is the only way by means of which GNRs with atomically precise structure have been synthesized to date. To this aim, molecular precursors were synthesized and studied that were planned to polymerize undergoing different chemical reactions on the surfaces and under ultra-high-vacuum: (i) Ullman coupling and (ii) enediyne cyclizations followed by radical step growth. Both routes led to highly interesting results.

Lastly, I returned to Prof. Ortega's group again. Here I have resumed the research on the molecular blend monolayers and started new experiments on surface-supported chemistry, both closely related to the research lines followed during my previous periods in the DIPC and UC Berkeley.

A combination thereof is in fact among the future research plans that lie ahead with my recently awarded ERC-STG-2014 grant, in which I plan to bring "on-surface chemistry" to new levels of sophistication by the synthesis of functional materials with great levels of complexity and perfection.

Resumen del Currículum Vitae:

I graduated in physics from the Universidad Complutense de Madrid in 2001. In 2003 I embarked in the PhD Program of the Universidad Autonoma de Madrid, although performing my investigations on the growth and structure of organic semiconducting thin films at the Max-Planck Institute for Metals Research (Stuttgart, Germany) in the group of Prof. Helmut Dosch. During this time I performed my first research stay (~2 months) at the National Institute for Materials Science (NIMS) in Tsukuba (Japan), which I have repeated henceforth either (twice more) or with a competitive Japanese Society for the Promotion of Science short-term postdoctoral fellowship (once). After graduating in 2007 I moved as a postdoc to the Donostia International Physics Center to study the crystalline and electronic properties of metal-organic interfaces in Prof. Enrique Ortega's Nanophysics Laboratory. In 2010 I joined the Molecular Foundry of the Lawrence Berkeley National Laboratory (LBNL) in California as a postdoc and studied the chemistry underlying new optical development processes in lithography. In 2011 I moved to Michael Crommie's group at the University of California at Berkeley with a competitive Marie Curie postdoctoral fellowship, focusing my research on the synthesis of graphene nanoribbons from molecular precursors. On the return phase of the Marie Curie fellowship I moved back to Prof. Ortega's group in San Sebastian in 2013, where I am currently employed as a Guipuzcoa Fellow studying organic self-assembled structures on inorganic surfaces. To date I have published 47 peer-reviewed articles, many in major international multi-disciplinary and leading journals (1 Science, 1 Nat. Nanotech., 2 Nano Lett., 4 ACS Nano, 2 Adv. Funct. Mater., 1 J. Am. Chem. Soc., 3 Phys. Rev. Lett., etc). So far the publications have accumulated over 930 citations (source: google scholar), yielding an H-index of 18. Seven of the articles have been further featured as journal covers. I have also written 2 chapters in books

published by the RSC and Springer, respectively. I have supervised 2 master theses and 2 PhD theses. I have held 11 poster and 37 oral presentations (16 thereof invited) in national and international meetings and seminars. I received the Fonda-Fasella Award as the best young researcher at Elettra Synchrotrone Trieste in 2013. I have participated in national and international projects and I am a ERC-STG-2014 grantee.

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CONVOCATORIA 2014

Turno de acceso general

Nombre: **VILATELA GARCIA, JUAN JOSE**
Referencia: RYC-2014-15115
Área Científica: Ciencia y Tecnología de Materiales
Correo Electrónico: juanjose.vilatela@imdea.org

Título:

Multifunctional Nanocomposites

Resumen de la Memoria:

In spite of my young age (32) I have been active in materials science research for 13 years, in 4 countries (Spain, UK, US and Mexico) in two continents. I am currently a researcher at IMDEA Materials Institute as head of the Multifunctional Nanocomposites group, a team of 2 postdocs and 7 PhD students, supported by two FP7 European projects (which I am the coordinator of), 3 industrial contracts (Airbus, Future Fibres, B/E Aerospace US), 2 National grants (Plan Nacional, CM) and a National Excellence Network. The group, which I started only 3.5 years ago, has rapidly become active in publishing (13 papers, e.g. ACS Nano, Chem. Mater., Carbon) including a review article and a book chapter, as well as filing a patent currently under exploitation by Airbus and 2 in preparation with undisclosed industrial partners. Since 2014 I am an adjunct Professor of Materials Science at Carlos III University of Madrid. Previously I was a postdoc and PhD student at the University of Cambridge (2005 – 2011); manager of the industrial research laboratory at Jumex, Mexico (2004 - 2005); and a visiting scientist at Prof. Ajayan's group in RPI, US (2004), and at Prof. Terrones' group in IPICYT, Mexico (2003). The research of my group at IMDEA Materials (http://www.materials.imdea.org/groups/mng/) is focused on the development of macroscopic materials made up of nanobuilding blocks in a way that the unique properties at the nanoscale are preserved through the assembly process and a new generation of high-performance engineering materials is produced. Central to the group¿s work is a unique process for making a continuous macroscopic fibre made of aligned Carbon NanoTubes (CNT). I was involved in the early developments of this fibre synthesis process in Cambridge from 2005-2011, publishing cutting edge work (e.g. Science, Adv. Mater., Adv. Funct. Mater., etc) featured also in international media (BBC, Japanese Television). I took part in the transfer of this technology to Tortech, a Joint Venture between a Cambridge spin off and Plasan set up to scale-up the fibre process with a 5 M€ first-round investment and using various patents developed at Cambridge, including one of which I am co-inventor. Building on my previous work, I set up a set-up a reactor for synthesis of kilometres a continuous fibres made up of CNTs, thus becoming the second laboratory in Europe (besides Cambridge) and one of the 4 in the world (together with Tianjin University, China, and University of Seoul, Korea) with this singular facility. The material produced is scientifically fascinating in that it has a complex hierarchical structure and properties that require study at multiple length scales. Our long term (2-years) beamtime allocation at Alba synchrotron, for example, enables in-situ mechanical/electrical measurements during WAXS/SAXS acquisition (http://issuu.com/albasynchrotron/docs/newsalba_def/17). In addition to the development of this semi-industrial material, the research group studies other research areas: simultaneous realisation of charge and stress transfer in nanostructured hybrids for energy harvesting and storage; structural composites based on continuous (>km) CNT fibres; electron transfer through tunnelling between nanocarbons and small molecules in close proximity and its application in sensing; control of CNT chirality and doping on a km scale.

Resumen del Currículum Vitae:

Sept 2014 – present. Adjunct Professor of Materials Science, Carlos III University of Madrid, Spain.
June 2011 – present. Research Group Leader (http://www.materials.imdea.org/groups/mng/), IMDEA Materials Institute, Spain.
June 2009 – May 2011. Postdoctoral research associate, University of Cambridge, UK.
October 2005 – May 2009. PhD student, University of Cambridge, UK.
August 2004 – July 2005. Research Laboratory Manager, Advanced Plastics Laboratory, Jumex, Mexico
May – July 2004. Visiting scientist, Prof. P. Ajayan, Department of Materials Science, Rensselaer Polytechnic Institute (RPI), US.
May – July 2003. Visiting scientist, Prof. M. Terrones, Department of Materials Science, IPICYT, Mexico
Publications

I have co-authored 24 publications (9 as first and 6 as corresponding author), including an invited review article and a book chapter, with currently >600 citations and an h-index of 11. Quality has been prioritised over quantity, as reflected in the journals where these publications have appeared: Science (1), Advanced Materials (1), Advanced Functional Materials (1), ACS Nano (4), with impact factors in the range 10-31. Other publications in highly-reputed more specialised journals but still of high impact factor (up to 8.5) include Chem. Mater. (1), Small (1), J. Mater. Chem. A (1), Carbon (4), Comp. Sci. Technol. (1), J. Appl. Cryst. (1), Chem. Sus. Chem. (1), Phys. Status Solidi B (1), J. Nanosci. Nanotechnol. (1), J. Eng. Fib. Fab. (1), Int. J. Mater. Form. (1), Chem. Eng. J. (1).
Technology transfer
Since joining IMDEA Materials my research group has signed 3 long-term industrial contracts with large international companies (Airbus, BE Aerospace and Future Fibres), worth around 700 k€ and in which I act as PI. Taking into account other industrial projects I have been

directly involved in throughout my career I have worked with 5 large companies from 5 different countries (UK, US, Israel, Spain and Mexico) and produced 4 patents currently under industrial exploitation, with 2 more in preparation. A large part of my work of my PhD at Cambridge is currently under industrial scale-up (http://www.plasan-na.com/tortech-carbon-nano-tube-technologies/) in the form of large-scale production of a new carbon fibre made up carbon nanotubes.

Research projects and applications (as Principal Investigator)

I am currently coordinator of 2 projects funded by the 7th Framework Programme of the European Union with a total funding of 658 k€, a National Plan project of 60 k€ and a Comunidad de Madrid Regional Government of 117 k€. Together with industrial contracts, the total funding I have obtained in the 3.5 years since joining IMDEA Materials Institute is around 1.7 M€. On my first application to the ERC starting grant last year I was granted an A. My 2011 Juan de la Cierva application scored of 99.9/100 and was ranked 2nd out of 132 candidates in Materials Science and Technology and my 2013 Ramón y Cajal application ranked first on the reserve list.

International Reputation and Mobility

I have been invited to deliver various international talks (3), oral presentations (9) and seminars (>10), and acted as symposia and workshop organiser in different countries (Cambridge, UK; Clemson, US; Warsaw, Poland; Madrid, Spain; San Luis Potosí, México).

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AYUDAS RAMÓN Y CAJAL
CONVOCATORIA 2014

Turno de acceso general

Nombre: **CASTELLANOS GOMEZ, ANDRES**
Referencia: RYC-2014-16471
Área Científica: Ciencia y Tecnología de Materiales
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Título:

Two-dimensional semiconductors for optoelectronics and nanomechanics

Resumen de la Memoria:

In the following I will detail my research career which comprised different periods including four year Ph.D., three months internship and 45 months post-doctoral stay.

(2007/2011)
My Ph.D. thesis (supervisor Prof. Nicolás Agraït) initiated a research line in the Low Temperature Laboratory of the Universidad Autónoma de Madrid, devoted to the study of electronic and mechanical properties of two-dimensional sheets, such as graphene, MoS2, NbSe2 and mica by scanning probe microscopy. I developed my own experimental techniques and tools to carry out my research, gaining remarkable experimental skills. In addition, I had the chance of developing my teaching skills supervising the work of B.Sc. students in the courses "Técnicas Experimentales IV and V". The excellence of my Ph.D. research is expressed by the fact that my thesis was marked with the Highest Qualification, obtaining Cum Laude, Doctor Europeus and "Extraordinary Ph.D. of the course 2010/2011" awards.

(2010/2011)
In the last three months of my PhD thesis I visited Prof. Bart J. van Wees' group at Zernike Institute for Advanced Materials (University of Groningen, The Netherlands). In this period I worked on two different projects. The first one dealt with the development of an ultraclean all-dry transfer technique to deposit graphene on top of other 2D crystals. The second project, which exploited my scanning tunnelling microscopy knowledge, consisted on studying the changes in the electronic properties of graphene and graphite after an Argon/hydrogen plasma treatment.

(2011-present)
In May 2011, I started as a post-doctoral fellow in the Molecular Electronic Devices (MED) group at Delft University of Technology, under the supervision of Prof. Herre van der Zant. This position gave me the chance to achieve a deeper insight in the electrical and mechanical properties of atomically thin 2D materials using a complementary approach: by studying the electronic transport in nanodevices and nanoelectromechanical devices. Apart from the training in state-of-the-art nanofabrication procedures and techniques, I had the chance to learn various optical spectroscopy techniques such as Raman spectroscopy, photoluminescence and scanning photocurrent microscopy.

In Delft, I am in charge of the research on optoelectronic and nanomechanics in novel 2D materials carried out in the Molecular Electronic Devices group. More specifically I am currently involved in the fabrication and characterization of MoS2-based nanodevices such as field-effect-transistors, photodetectors and mechanical resonators. Part of my work can be considered as pioneering in the field of two-dimensional crystals beyond graphene. Among other achievements, I demonstrated that photocurrent generation in single-layer MoS2 is dominated by the photothermoelectric contribution and that local strain engineering can be used to tune the optoelectronic properties of atomically thin materials and to modify the dynamics of excitons generated upon illumination. I also reported the first measurements of the mechanical properties of atomically thin mica and MoS2 materials and mechanical resonators. These results pave the way towards using these novel 2D crystals in flexible electronic and optoelectronic applications.

Resumen del Currículum Vitae:

Andrés Castellanos Gómez (Spanish, 1983) obtained his PhD (Cum Laude and "Extraordinary Award", March 2011) at the Condensed Matter Department of the Autonoma University of Madrid. His PhD work was devoted to the study of the electrical and mechanical properties of atomically thin materials (such as graphene, MoS2 and mica) by scanning probe microscopy techniques. During his postdoctoral stay (May 2011 - Present) at the internationally renowned Kavli Institute of NanoScience in Delft University of Technology (The Netherlands) he worked on the study of optoelectronic and electromechanic properties of nanodevices based on 2D materials. In Delft, Andres had the chance to supervise several PhD, MSc and BSc students, whose projects were related to 2D materials. Andres' research has been funded by a prestigious and competitive Individual Marie Curie Fellowship (180 k", Apr 2013 " Apr 2015), by a Marie Curie co-funded action AMAROUT II (~80 k", Apr 2015-Apr 2017) and by the Fundación BBVA (40 k", Apr 2015-Apr 2016).

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Turno de acceso general

Andrés Castellanos Gómez is author of 2 invited book chapters and 48 peer-reviewed papers (and 8 more are currently under review), amongst which Nature Nanotech. (1x), Nature Commun. (1x), Adv. Mater. (3x), Nano Letters (5x), JACS (1x), Small (3x) and Nano Research (4x). His degree of authorship is clear as he is the first and/or corresponding author in more than 80% of his articles. According to Google Scholar he achieved a total number of citations of 1009 (H-index 17). Dr. Castellanos-Gomez is member of the Editorial Board of the Journal Graphene (Scientific Research Publishing, since 2012) and he is frequently asked as Reviewer in prestigious journals (such as Science, Nature Mater., Nature Nanotech., Nature Photonics, Nature Commun., Adv. Mater., Nano Lett., ACS Nano, JACS, Adv. Funct. Matter and Small).

The work of Dr. Castellanos-Gomez has attracted attention of the scientific community as he has been invited speaker in 13 conferences, 2 winter school and 19 seminars. He received the Young Researcher Award 2012/2013 given by the Grupo Español del Carbón, the Young Researcher Award 2013 given by the Instituto Universitario de Materiales (Alicante University) and the Joseph Wang Award for Young Researchers in Nanoscience 2014/2015 by the Cognizure publishing group.

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Turno de acceso general

Nombre: **DEL PINO GONZALEZ DE LA HIGUERA, PABLO ALFONSO**
Referencia: RYC-2014-16962
Área Científica: Ciencia y Tecnología de Materiales
Correo Electrónico: pdp.glez@gmail.com

Título:

Smart nanostructured materials for life science applications

Resumen de la Memoria:

Career:
2002: I graduated in Physics from University of Sevilla.
2003-2007 (research assistant, 48 months): I was a PhD student at the chair of Molecular Biophysics of the Technische Universität München (TUM). In March 2007, I was awarded with my PhD degree (Magna Cum Laude) with the thesis entitled "Investigation of Copper-Binding of Full-Length Prion Protein", which was awarded with the International Chorafas Foundation Award ($4000 personal prize).
2007-2009 (postdoc 22 months): I joined the group of Prof. W. Parak in the Center of Nanoscience of the Ludwig-Maximilian Universität, where I started to work in Nanotechnology for applications in Life Science.
2009-2012 (postdoc 37 months): I joined the group of Dr. Jesús M. de la Fuente in the Institute of Nanoscience of Aragón (INA), where I worked in developing setups for magnetic and plasmonic hyperthermia, as well as development and bioapplications of "smart" materials.
2012 (visiting postdoc, 8 months): fellowship-DGA to visit the group of Parak in Marburg.
2013 (9 months, resigned in Oct. 2013): I was awarded with a fellowship as ARAID independent researcher.
2013- today: researcher at CIC biomaGUNE where I am in charge of the Bioengineered Particles laboratory (on behalf of Prof. W. Parak).

My research lines focus on the development of "smart" materials for life science applications: therapy, imaging and sensing. So far, I have mainly been involved in the synthesis of plasmonic and metal oxide nanoparticles, polymer microparticles, surface-engineering of nano- and micro-particles for bioapplications, as well as in setting up technological platforms (in Munich, Marburg and Zaragoza) for magnetic or light stimulation of developed materials inside living cells. Although I am a physicist (PhD biophysics) from education, my research is very broad, going from the synthesis of the materials to the application of them in cell cultures, and even setting up the technological platforms required for specific experiments with lasers and microscopes. I consider myself a very versatile material scientist, with the expertise in many relevant areas in bio-nanotechnolgy, from the design to first proof of principles. I have also always work towards developing new skills in every new step of my career (PhD: spectroscopy; 1st postdoc: microscopy, cell culture, synthesis; 2nd postdoc: functionalization, advance synthesis, nanotoxicology). Currently, in CIC biomaGUNE, I work in the development of new protocols towards surface engineering of NPs and in the development of novel protocols to produce radiolabeled inorganic NPs for in vivo experiments.

Resumen del Currículum Vitae:

Overall, I have over 40 publications (average IF 7.65, h-index: 15), most of them in high impact journals such as ACS Nano (3x), Small (x3), Nanomedicine (x3), Langmuir (x3), Ang. Chem. (1x), Nano Letters (x1), Nano Today (x1), Adv. Mater. (x1), Chem. Comm. (x1), Acc. Chem. Res (x1), etc. I have participated in several projects funded by EU, national and regional agencies as well as private partners. I have also had my own funding (Cheque Ibercaja, DGA-fellowship, ARAID-fellowship, CIC biomaGUNE group funds, plan nacional). I would also highlight the production of two licensed patents, my contributions towards getting funding, as well as my role as student¿s supervisor (6 students to date). I have been guest editor of Journal of Biomedical Optics, and also a regular reviewer of several journals in the area of materials science such as ACS Nano, Langmuir, Nanoscale, Small, etc. Currently, I am guest editor of MDPI Nanomaterials (issue: "Nanoparticles in Theranostics") and BioMed Research International (issue: "Updates in personalized treatment: from medicine to nanomedicine").

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Turno de acceso general

Nombre: **GUTIERREZ MARRUEDO, LUCIA**
Referencia: RYC-2014-15512
Área Científica: Ciencia y Tecnología de Materiales
Correo Electrónico: lucia@icmm.csic.es

Título:

Iron-containing nanomaterials in diseases, diagnosis and treatments

Resumen de la Memoria:

Including the completion of my PhD in 2008 and 6 years of postdoctoral experience, I have been dedicated to full-time research since 2004. My work has taken place in four different institutions: Universidad de Zaragoza in Spain, Queen Mary University of London in the UK, the Materials Science Institute of Madrid (ICMM) in Spain and The University of Western Australia in Australia.

I completed my PhD in December 2008 at the Materials Department of the Engineering Faculty at UZ in Spain, with Professor Francisco J. Lázaro as my PhD supervisor. I was awarded a fellowship for 4 years to undertake a PhD by the Regional Government .The last year of my PhD, I performed a summer stay at QMUL, under the supervision of Professor Fanis Missirlis, funded by Caja de Ahorros de la Inmaculada. Because of the successful results obtained during my visit to QMUL in 2008, I was offered a short-term contract as Postdoctoral Research Assistant in the School of Biological and Chemical Sciences at QMUL just after the completion of my PhD. While working at QMUL, I was awarded a prestigious Spanish postdoctoral national research award to work in the lab of Professors Carlos Serna and Maria del Puerto Morales from the Biomaterials and Bioinspired Materials Department at ICMM and I moved to Madrid in June 2009. My contract included the possibility of spending two years visiting an overseas laboratory, which allowed me to join the Biomagnetics group, leaded by Professor Tim St. Pierre, in the School of Physics at UWA from Octiber 2010 to November 2012. Nowadays, my work at ICMM is financed by the AXA Research Fund.

Since my PhD, my research work has been focused on the study of iron-containing nanomaterials in diseases, diagnosis and treatments. In particular, my work has evaluated the presence iron-containing nanomaterials in different biological matrices, paying especial attention to their speciation and the transformations they may suffer in the organisms. Under this topic, it is included the study of iron deposits in liver or brain as a consequence of different pathologies (e.g. Friedreich ataxia, haemochromatosis, sickle cell disease, malaria etc.). It also includes the use of magnetic nanoparticles for biomedical applications (e.g. contrast agents for Magnetic Resonance Imaging or drug delivery systems).

My current main research line focuses on the evaluation of magnetic nanoparticles toxicity. The main concern arising from the increasingly widespread use of nanoparticles for biomedical applications is the little information we have on their biodistribution and toxicity in the body. To fill this knowledge gap, my research aims at developing methods for the in situ identification and quantification of magnetic nanoparticles in tissues based on magnetic characterization techniques. Results from my work are fundamental to the evaluation of particle performance and side effects.

Resumen del Currículum Vitae:

During these ten years of research career I have co-authored 36 publications comprising 34 articles and 2 book chapters, being the first author of 17 of them (47%) and second author of 11 of them (30%). My work has been cited over 525 times (data obtained from Scopus on 12/01/2015) published in high impact factor journals such as Chemical Society Reviews (I.F. = 24.892), PNAS (I.F. = 9.737), Blood (I.F. 10.558) and Biomaterials (I.F. = 7.404). Of special relevance is the highly cited review described as one of my relevant achievements in the previous section.

My work has been presented in 45 conference presentations (58% talks, 42% posters) from 29 different conferences. Evidence of the international relevance of my current research line is that I was recently invited to give a talk at the conference "Frontiers in Biomagnetic Nanoparticles", being also responsible of chairing one of the sessions at this conference. In addition, I have also been invited to present my work in 10 invited talks in places such as the Centro Nacional de Investigaciones Cardiovasculares (Madrid, Spain), Centre for Microscopy, Characterisation and Analysis (Perth, Australia), Western Australia Nanochemistry Research Institute (Perth, Australia), Laboratoire de Physique de la Matière Condensée et Nanostructures (Lyon, France) and the University of Granada (Granada, Spain).

I am co-investigator on 4 ongoing funded research projects, 2 of them from the 7th Framework program of the European Union (described in details in the previous section). Of special relevance is the fact that I am the principal investigator of the international project funded by the AXA research fund.

While at UZ, QMUL, ICMM and UWA I have been responsible for the teaching and supervision of 9 undergraduate students, and I am currently supervising one PhD student and 3 undergraduate student projects. I have also given part of a course on Biotechnology for high school teachers on biomaterials. In addition to this, I have also been involved in the educational outreach activities at ICMM and UWA, currently being a guide for groups of visiting students at the outreach activities from ICMM.

High international regard for my research is evidenced by the fact that I frequently act as referee for international journals including: ACS Nano, PLOS ONE, Journal of Inorganic Biochemistry, Applied Physics Letters, Applied Surface Science, Nanoscale Research Letters, Journal of Magnetism and Magnetic Materials y AIP Conference Proceedings. In adittion, I am also guest editor of the Special Issue "Challenges for Diagnosis of Malaria and Neglected Tropical Diseases in Elimination Settings", to be published by the Journal of Biomedicine and Biotechnology.

In addition to links with the research groups in which I have been working, I do also keep collaborations with other groups and the details are described as one of my relevant achievements in the previous section.

In 2014 I started the organization of a monthly Seminar Series at the ICMM, called "Young Scientist at ICMM". I also organized the workshop " Iron in disease, diagnosis and treatments" in June 2014, where speakers from 6 different institutions presented their work.

I am also a member of the Australian Nanotechnology Network, the International Bioiron Society and the Grupo Ibérico de Ferropatologías.

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CONVOCATORIA 2014

Turno de acceso general

Nombre: **SANCHEZ JIMENEZ, PEDRO ENRIQUE**
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Área Científica: Ciencia y Tecnología de Materiales
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Título:

Solid State Reactions of Materials for Energy and the Environment

Resumen de la Memoria:

The candidate's research deals with solid state reactions of interest in materials science, especially in materials for energetic and environmental applications.
During his PhD degree (2008), the candidate developed a series of new kinetic analysis tools and experimental methods for studying solid-state reactions, including a novel physico-geometrical model of polymer degradation, which significantly improved the procedures used so far in the literature. Since then, he has continued researching in kinetics, publishing a well-received deconvolution procedure for complex reactions and criticizing inadequate methods widely extended in the literature. These methods proposed by the candidate allow the modelling of complex kinetically driven processes so that their behavior under different conditions can be accurately predicted while at the same time, gain insight into the underlying physico-chemical processes. The candidate's works within the kinetics field have produced a lasting impact and his published methods are now extensively used by scientific community, averaging 30 cites per paper.
As a postdoctoral researcher, the candidate worked at the University of Colorado, and at the IEM in Montpellier, in the field of Polymer Derived Ceramics, exploring the influence of the thermal synthesis and processing conditions on the properties of the final ceramic in terms of lithium insertion capability and piezoresistivity for use as anodes in lithium-ion batteries and sensors at extreme temperatures.
In 2011 he joined the Reactivity of Solids group at the ICMS, obtaining successively the JAE-Doc and Juan de la Cierva grants. There, the candidate contributed to the rapid growth of the group, directing 3 Masters and 1 PhD Theses (3 more underway) and participating in several research and industrial projects, amounting over 1 million €, of which he is Primary Investigator in three. At the ICMS, the candidate extended his research to the mechanosynthesis of multiferroic materials and two energy and environment related topics: (i) postcombustion CO_2 capture and (ii) thermal fluids and phase change materials for thermosolar applications. This latter line is part of several industrial projects funded by Abengoa Solar aiming to increase the operating temperature range of current solar thermal energy facilities. Promising results have been obtained and a pilot plant is scheduled to start operating in 2015 in Solucar. The candidate has also produced notable results in the field of CO_2 capture by Ca-looping, a technique with great potential for reducing CO_2 emissions at power plants in a highly efficient and economic process. In his 14 papers published since 2013, the candidate has proposed alternative experimental set-ups that reduce the CaO sorbent inactivation and has provided valuable insight into the nature of carbonation/decarbonation reactions.
In October 2014, the candidate was awarded with a 2-year Postdoc grant (Marie Curie Actions, UE funded) in a competitive selection call, for leading an international research project (budget 153k €) in energy-harvesting piezoelectric devices to be carried out by the candidate at the University of Cambridge.
Regarding the impact of scientific research, the candidate has published 57 ISI papers (744 cites in total), and 1 book chapter. On 43 out of 57 papers he is first or second author. Current h-index is 16.

Resumen del Currículum Vitae:

The candidate obtained his PhD degree in Chemistry at the University of Seville (2008) in the kinetic analysis of polymer degradation processes. During PhD and his career thereafter, he has developed several kinetic analysis tools which have significantly improved the methods available so far in the literature. Within this field, the candidate has published 27 papers, which have produced a lasting impact in the topic, averaging 31 cites/paper (counting up to 2013).
After obtaining his PhD, the candidate spent 2 years as a postdoctoral researcher in the University of Colorado at Boulder and later on 6 months at the IEM at Montpellier, working in the field of Polymer Derived Ceramics. In the topic he published 3 papers, participated in the writing of one awarded US Nat. Science Foundation (Grant Nº 0502781) proposal and tutored two Master students.
In 2011 the candidate returned to Spain and joined the Reactivity of Solids group at the ICMS after obtaining successively the JAE-Doc and Juan de la Cierva grants in competitive calls. At the ICMS he continued researching in reactivity of solids, both thermally and mechanically induced. Research topics now extend to the mechanosynthesis of multiferroic materials, multicyclic CO_2 capture and the development/characterization of new thermal fluids and phase-change materials. Since his return, the candidate has taken part in several projects and industrial contracts, amounting to 1 million €, in whose writing and submission he actively participated. He has also proven his ability to independently raised fund and presently he is Primary Investigator of two projects obtained in competitive calls, for a total of 170k €. All the research lines have proven successful, with 35 papers published since 2012.
The candidate has ample experience in knowledge transfer since in the last 2-3 years he has played an active role in 3 contracts with Abengoa, aiming to increase the operating temperature range of current solar thermal energy facilities. The candidate is the scientific

coordinator in one of such projects. Promising results were obtained and a pilot plant is scheduled to start operating within this 2015 year. He has also experience in managing international projects. Apart from his postdoctoral stays, he has recently been awarded with a 2-year Postdoc grant (funded by Marie Curie Actions) for leading an international research project (budget 153k €) in energy-harvesting piezoelectric devices to be carried out jointly with the University of Cambridge, where he currently works.
The candidate is member of the Doctorate Program "Ciencia y Tecnología de los Nuevos Materiales" at the University of Seville. He has directed one PhD thesis (with 3 more underway) and 3 Master theses. He has published 57 ISI papers (744 citations), of which he is first or second author on 43, showing a high level of involvement in the work, and is the corresponding author in many of them. 85% in the last 5 years are Q1. The average number of citations per paper (counting only up to 2013) is 21. Current h-index is 16. The candidate has also participated in over 40 communications in international and national conferences. As a final note, he has been included in the "Who is Who in Thermal Analysis and Calorimetry" book (2014, Springer), in which the most relevant worldwide scientists in the field of Thermal Analysis are listed.

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AYUDAS RAMÓN Y CAJAL
CONVOCATORIA 2014

Turno de acceso general

Nombre: **GUILLAMON GOMEZ, ISABEL**
Referencia: RYC-2014-15093
Área Científica: Ciencia y Tecnología de Materiales
Correo Electrónico: isabel.guillamon@uam.es

Título:

New high magnetic field microscopies for material science

Resumen de la Memoria:

Superconductors carry electricity without losses and are needed to develop new technologies for energy, medical imaging or high magnetic fields. My research aims at facing major gap blocking challenges in superconductivity:

• Improving current carrying capabilities of superconductors by studying vortex matter.
I have made several breakthroughs in vortex physics including the first and long sought direct visualization of the vortex liquid. I also understood the microscopic mechanism behind the order-disorder transition in the vortex lattice at high magnetic fields, first observed the vortex creep at very low temperatures and designed a new method to improve current carrying capability in nanostructured superconductors [Nat. Phys. (2009, 2014), PRL (2011) and Nat. Commun. (2013)].

• Understanding the pairing mechanism to increase the superconducting critical temperature Tc.
I measured the Fermi surface and electronic correlations in the new Fe-based superconductors showing the relationship between normal state electronic properties and Tc [PRL (2012, 2013)]. To perform this work I obtained a Newton Fellowship from the Royal Society and an EU IEF-Marie Curie.

• Interplay with other ground states such as charge density wave.
I first studied charge order within vortex cores, determining its relation to the superconducting gap [PRL (2008), PRB (2008)].

My objective is to make precise experiments that allow getting further understanding on these problems. I use advanced microscopic and macroscopic experimental tools such as scanning tunneling microscopy (STM) or quantum oscillations -which require very low temperatures and very high magnetic fields- and work to improve cryogenic microscopy [one patent]. I have worked at UAM, University of Bristol and Stanford University, and performed experiments in international high magnetic field facilities in Europe (EMFL) and US (NHMFL).

Currently, I am enthusiastically setting up a new research project to study the problems of high Tc superconductivity by first combining STM and very high magnetic fields. To support this project, I have obtained public (4 year EU-CIG) and private (AXA and FBBVA grants) funding. I participate in two EU proposals headed by EMFL laboratories where UAM is, for the first time, one of the beneficiaries. I am building a STM which will be operating at magnetic fields of 17 T and carried to international high field facilities to measure up to 40 T and I am setting up crystal growth for superconductors (HTc Fe based).

I want to understand the physics of superconductors by growing pristine single crystals and making powerful microscopy experiments in my group, with the objective to find new systems which enhance superconducting applications.

Resumen del Currículum Vitae:

Isabel Guillamón has provided major breakthroughs in superconductivity and influenced the advancement of several research areas such as vortex physics, HTc superconductivity, quantum criticality and 2D physics.

She graduated in Physics in 2004 (Premio Fin de Carrera, UM) and received PhD at UAM in 2009, supervised by H. Suderow and S. Vieira (FPU grant). Since then she has been awarded competitive postdoctoral grants. In 2010 she joined the group of A. Carrington at the University of Bristol for 3 years with MINECO, International Newton and IEF-MC grants. In 2011 she made a 2 month research stay at Stanford Univ. In 2013 she was awarded a MC Integration Grant and moved back to UAM. Now she leads high magnetic field research with an AXA postdoctoral grant and a FBBVA project (being the only Spaniard obtaining an AXA 2014 fellowship).

During her whole career she has been largely independent, by designing and interpreting many of the experiments of her PhD, and by choosing some of the subjects which she addressed as post doc. Her main motivation is to obtain new insight into problems relevant to applications such as superconductivity, by making experiments in understandable model systems. This is a competitive endeavor in which

she has chosen highly sophisticated tools, such as scanning tunneling microscopy and quantum oscillations. She also makes experiments at international high magnetic field (HMF) facilities in EU (EMFL) and US (NHMFL) and develops and builds microscopes working in the mK. She actively works within a regional program that supports the construction of HMF superconducting coils and is involved in two EU proposals (INFRA and ETN) together with EMFL researchers to develop STM above 40T and strengthen the participation of Spanish researchers within the HMF community. She has initiated the growth of Fe-based superconductors at UAM.

Her research leads to publications in high impact journal such as Nat. Phys., Nat. Commun. and Phys.Rev.Lett., and has been highlighted in Phys. Today, BES report of DOE or Europhys. News. She has more than 30 publications (13 as 1st author, 19 including those as 2nd author) and 1 patent, and has led her highest impact and most cited papers. Recently she has been invited to write a topical review on 2D vortex lattice as leading authority in the field.

She has given 14 invited talks in international conferences with selection committee and 5 seminars in recognized research institutions thanks to her contribution in the field. She also participated in a number of scientific meetings with oral and poster presentations.

She leads now 4 research grants totaling more than 270 k€ and has led further 2 grants with an amount of 325 k€. She has actively participated in 19 regional, national and EU research projects and worked in the organization of scientific events (3 international workshops in 2012, 2014 and 2015).

She has been awarded a competitive APS Outreach Mini-Grant in 2014 (7% success rate) and actively participates in outreach events.

She is regular referee for various scientific journals such as Phys. Rev. (Lett. and B), Nanotech. and Nature journals. Since 2013, she coordinates the last year undergraduate experimental lab at UAM and co-directs 3 PhD thesis. She has supervised the Phys. Msci final project of undergraduate students in UoB and UAM.

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AYUDAS RAMÓN Y CAJAL
CONVOCATORIA 2014

Turno de acceso general

Nombre: **PEPONI , LAURA**
Referencia: RYC-2014-15595
Área Científica: Ciencia y Tecnología de Materiales
Correo Electrónico: lpeponi@ictp.csic.es

Título:

Diseño, síntesis y caracterización de materiales compuestos poliméricos nanoestructurados multifuncionales

Resumen de la Memoria:

The research career of Laura Peponi can be summarized as the design, synthesis and characterization of multifunctional nanostructured polymer composites with five main research lines:
Natural fibers and their polymer composites
Nanostructured self-assembling block copolymer matrices and their reinforced nanocomposites.
Synthesis of bio-polymers and biocatalysis
Polymeric micro and nano-fibers by electrospinning
Shape memory polymers and polymeric-based nanocomposites
Main milestones:
2003: ERASMUS GRANT (6 months) from the University of Perugia, Italy to the University of Basque Country (GMT), Spain, working under the Prof. Mondragon supervision, on the processing and characterization of composite materials based on polypropylene reinforced with natural fibers (European Project FP5 ECOFINA): 2 papers in 2008
2004-2007: International PhD degree in Materials Nanotechnologies, directed by Prof. Kenny in collaboration with Prof. Mondragon, in the framework of the European Network of Excellence FP6 NANOFUN-POLY, working on the nanostructuration of self-assembling block copolymers and their nanocomposites reinforced with 0D nanoparticles: 9 papers and several participations to congresses.
From 2006 as active member of the European Centre for Nanostructured Polymers (ECNP) she was tutor at the European Master on Polymer Nanotechnology (2006, 2007) organized by NANOFUN-POLY and ECNP.
Participation in European Projects: ECOWINDOW, INNORUBBER, ICE.
2008-2010: Post-Doc position at University of Perugia in collaboration with GMT in Spain and new collaboration with ICTP-CSIC in Madrid working on the confinement of 1D and 2D nanoparticles in only one block of block copolymers: 3 publications and 4 publications with GMT without her PhD supervisor.
In 2009 she co-directed one final project on Materials Engineering, at the University of Perugia.
Local Principal Investigator and WP8 leader of the European Project FP7 POCO.
2011–2012: "Juan de la Cierva" Post-Doc at ICTP-CSIC in Madrid, Spain: 4 paperss
Collaboration with her previous Italian Group and with University of Sassari: 6 papers.
Collaboration at projects: MAT2010-21494-C03-03: 8 papers.
2012: Mobility Action of CSIC. 2 months stage at the University of Guanajuato, Mexico: 1 paper.
December 2012–now: "JAEDOC" Post-Doc position at ICTP-CSIC Madrid: 10 papers
Participation in FP7 European Projects: COMPNANOCOMP, GENISLAB, ECNP-GROWTH, PHOTOSMART
Participation in HORIZONT 2020 Project: NANOLEAP-NMP-PILOTS-2014 and MAT2013-21494-C03-03: 3 papers and MULTIMAT-CHALLENGE (Madrid Regional Government).
Since- 2012 she has co-directed 3 Master students at ICTP-CSIC Madrid and three PhD thesis (two still running).
Since 2005 she was involved in teaching experiences at the University of Perugia (Materials Science and Technology, Polymer Technology, Nanotechnology courses), the University of Guanajuato and CINESTAV, Mexico, and the University of Sassari, Italy.
At the end of 2014 Laura Peponi started four new collaborations as IP (IITRoorke - India; Universidad Politécnica de Madrid, Universidad del País Vasco, ECNP).
At this moment, Laura Peponi has published, starting from 2008, almost 60 scientific documents (peer-reviewed articles, book chapters, articles on scientific journals, diffusion articles etc.) and her scientific work has been reported at more than 50 International Congresses

Resumen del Currículum Vitae:

Laura Peponi (LP) started her scientific career in 2003 as ERASMUS student realizing an experimental research stage on polymeric composites reinforced with natural fibres at the Materials+Technology Group directed by Prof. Mondragon at the University of Basque Country (EHU-UPV) in San Sebastian, Spain as part of her final project for the Materials Engineering Degree at the University of Perugia (UNIPG), Italy, directed by Prof. Kenny.
In the period 2004-2007 LP realized her International PhD thesis in the framework of the NoE NANOFUN-POLY, coordinated by Prof. Kenny, who was also the director of her PhD thesis on "Morphology-properties relationships of surfactant-coated silver

nanoparticles/poly(styrene-b-diene-b-styrene) block copolymer nanocomposites" developed in collaboration with EHU-UPV. Since the foundation of the European Centre for Nanostructured Polymers, ECNP in 2006, LP has been an active member.
In 2008 LP obtained a post-doctoral position at the Materials Science and Technology Group of UNIPG, working on the nanostructuration of nanocomposites based on block copolymers and 1D and 2D nanoparticles continuing her collaboration with EHU-UPV. In 2009 LP became local Principal Investigator and WP LEADER in the European Project, POCO organizing the Training Events (Madrid 2010, Dresden 2010, Madrid 2011, Lyon 2011, Prague 2012, Valencia 2012).
In January 2011 LP started her Juan de la Cierva Post-Doctoral position in the Dpt. of Polymeric Nanomaterials and Biomaterials, at ICTP-CSIC in Madrid working on the synthesis of bio-polymeric materials.
On December 2012 LP started her JAEDOC Post-Doctoral position at ICTP-CSIC working on the design, synthesis and characterization on stimuli-responsive bio-polymer and nanocomposites.
During her extended research work, LP was trained in several advanced experimental techniques and equipment including: atomic force microscopy and field emission scanning electron microscopy (both under her directly responsibility in Perugia and Madrid), surface, thermal, rheological, mechanical analysis and processing equipment, shape memory analysis and electrospinning (both under her directly responsibility in Madrid).
LP has matured teaching experience in Italy as well as in Mexico. In Italy related to the Materials Engineering Degree at the Faculty of Engineering of the UNIPG, started in 2005, and in Mexico from 2012 up to now, where she started a collaboration with Prof. Martinez-Richa of the University of Guanajuato thanks to a CSIC Mobility Action.
LP has co-directed one final project on Materials Engineering, 2009, and has tutored at the European Master on Polymer Nanotechnology (2006, 2007).
At ICTP she co-directed 3 Master Thesis of the "Master Universitario en Alta Especializacion en Plasticos y Cauchos".
She was co-director of 1 Phd Thesis on "Synthesis and characterization of shape memory bionanocomposites based on copolymers and blends of PCL and PLA biopolymers" and is co-diercting 2 PhD Thesis on "New Bio-Nano-Polymeric Electrospun Membranes for Biomedical Applications" (2015) and "Synthesis, processing and characterization of nanostructure bio-polymers and bio-nanocomposites" (2016) developed in the framework of the UNIPG Doctoral School.
LP has published, starting from 2008, almost 60 scientific documents (peer-reviewed articles, book chapters, articles on scientific journals) and presentations on more than 50 International Congresses.

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CONVOCATORIA 2014

Turno de acceso general

Nombre: **MIHI CERVELLO, ANTONIO AGUSTIN**
Referencia: RYC-2014-16444
Área Científica: Ciencia y Tecnología de Materiales
Correo Electrónico: agusmihi@gmail.com

Título:

Large Area Low Cost Photonic Architectures to Enhance Light Management in Optoelectronic Devices

Resumen de la Memoria:

As a researcher, my effort is aimed at solving some of the problems that emerging photovoltaic technologies present: obtaining higher efficiencies at lower costs. In particular, I study how photonic and plasmonic structures can enhance the efficiency of emerging solar technologies maintaining the low cost and ease of manufacture that made them popular. I develop fabrication routes that allow the incorporation of these photonic structures within solar cells, borrowing techniques commonly used in mass production processes and promoting the interaction between the industry and academia.

I obtained my Ph.D. in Physics from the University of Sevilla (Spain) with my research being carried out at the Institute of Materials Science of Sevilla (ICMS-CSIC) in the group of Prof. H. Míguez. I investigated the optical properties of surface modified photonic crystals and how their potential as light scattering layers in solar cells, both theoretically and experimentally. My research has clarified the optimum use of photonic bandgap materials within dye sensitized solar cells, and addressed some of the difficulties with integrating these periodic architectures within actual solar cell devices. Also during my PhD, I developed a new colloidal crystallization technique to implement large area colloidal crystals using the spin coating procedure.

In 2008, I was awarded one of the four postdoctoral fellowships that the Beckman Institute at the University of Illinois at Urbana-Champaign (USA) offers each year. Under this program, I collaborated with Prof. P.V. Braun to develop a technique that allowed the implementation, for the first time, of silicon photonic crystals in dye sensitized solar cells. As a Beckman fellow, I also collaborated with Prof. John A. Rogers, who introduced me to soft lithographic fabrication techniques. I took part of the SCALES project (Scalable Construction by Assembly for Large, Extended Systems funded by the DARPA agency), in which we developed a manufacturing capability for tiled photonic structures inspired by the scales found in butterfly wings.

In 2011, I was awarded with an ICFONEST postdoctoral fellowship among a pool of 30 candidates (supported by the Marie Curie COFUND). I joined the group of Prof. Gerasimos Konstantatos, a leading expert in the field of photodetectors and solar cells based in colloidal quantum dots. In his group, I worked on novel photonic architectures that can be combined with emergent solution processed quantum dot based solar cells, boosting their performance. I also worked on metal-insulator-semiconductor heterostructures that harvested the hot electrons generated in a nanostructured metal exhibiting photovoltaic response. The term 'hot electrons' refers to those carriers that have gained very high kinetic energy after being accelerated by a strong electric field in areas of high field intensities within a semiconductor device.

In March 2014, I was honored with the sole Martí Franqués Fellowship offered by the University Rovira i Virgili in Tarragona. Here I investigate ways of improving the efficiency of PTBx: PCBM bulk heterojunction solar cells using photonics.

Resumen del Currículum Vitae:

I obtained my Ph.D. in Physics from the University of Sevilla, with my research being carried out at the Institute of Materials Science of Sevilla (ICMS-CSIC) in the group of Prof. Hernán Míguez. I have been a postdoctoral researcher for three years at the University of Illinois in Urbana-Champaign (2008-2011) and for two and a half years at the Institute of Photonic Sciences in Barcelona ICFO (2011-2014). Since March 2014, I am a research director at the University Rovira i Virgili in Tarragona, where I can manage my own budget and guide students.

Throughout my career I have been awarded with prestigious and competitive fellowships, which included my own stipend plus research expenses. In 2008, I was awarded with a Beckman postdoctoral fellowship, which allowed me to collaborate with both prof. Paul A. Braun and John A. Rogers developing novel unconventional techniques to fabricate photonic nanoarchitectures compatible with current mass production processes. In 2011, I was awarded with an ICFONEST postdoctoral fellowship (Marie Curie COFUND action). I joined the group of Prof. Gerasimos Konstantatos at the Institute of Photonic Sciences (ICFO), a leading expert in the field of solar cells based in colloidal quantum dots.

In March 2014, I was honored with the sole Martí Franqués Fellowship - Starting Grant Profile- , offered by the University Rovira i Virgili in Tarragona. Under the scope of this fellowship, I applied to the 2014 ERC Starting Grant, being evaluated with an A (project fundable if enough funds become available) and I am currently placed in a reserve short list. At the URV, I act as a research director, managing students, applying for funding and conducting my own research.

My scientific career is endorsed by 39 publications which sum 1264 cites, with an h-index of 19, according to the Web of Science. Some of my publications include:

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11 Advanced Materials (IF=15.409),	1 ACSNano (IF=12.033),
1 Nature Nanotechnology (IF = 33.265),	1 Nature Communications (IF = 10.742),
1 Angewandte Chemie (IF=13.734),	1 Nanoletters (IF=12.940),
2 Advanced Optical Materials,	1 Advanced Functional Materials (IF=10.4),
1 Small, (IF=7.823)	

Google Scholar: http://scholar.google.es/citations?user=gBZ89EwAAAAJ
Researcher ID: http://www.researcherid.com/rid/F-6416-2011

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CONVOCATORIA 2014

Turno de acceso general

Nombre: **SHUTTLEWORTH , PETER**
Referencia: RYC-2014-16759
Área Científica: Ciencia y Tecnología de Materiales
Correo Electrónico: peter@ictp.csic.es

Título:

Development of Nanoparticle enhanced Functional Materials, and Green Methodologies from Sustainable Polymeric and Biorenewable Sources

Resumen de la Memoria:

The candidate's career has focused mainly on bio-renewable materials with a strong drive towards technology transfer through deep understanding of thermal and structural behaviour of complex polymeric systems to develop novel sustainable materials with value-added properties.
After graduating from Manchester University (BSc Chemistry, 2000), and employment at DH Scientific Ltd, he was awarded an EPSRC scholarship for a MRes Green Chemical Technology (2002-2003) at the University of York. Afterwards in collaboration with Interface, Inc. he developed a sustainable and economically viable switchable adhesive, from concept to industrial scale that has been patented and licensed to various companies, obtaining his PhD Chemistry from York in 2009, under Prof. James Clark. From 2009-2012 he worked on an EU-funded project, converting biomass to fuels and chemicals (patented), and additionally on the scale-up of a mesoporous carbon in collaboration with industry, leading to his participation in the creation of a spin-out company Starbon® Technologies Ltd. In April 2012 he joined the research group of Dr. Gary Ellis at the Instituto de Ciencia y Tecnología de Polímeros (CSIC) as a Juan de la Cierva Fellow developing advanced functional nanocomposite polymeric materials for diverse application areas, and has also gained experience at various synchrotron facilities (HASYLAB-DESY, DIAMOND and SOLEIL).
In summary, the candidate has a broad and strong scientific background in the development of biorenewable materials and excellent technology transfer capabilities and extensive experience working with industry. The projected future research of the candidate aims to consolidate his research and innovation experience to develop and successfully transfer to industry novel sustainable, bio-based materials with enhanced nanoparticle mediated properties in three priority areas of the EC and Horizon2020: food waste valorisation, environment and energy.

Resumen del Currículum Vitae:

The candidate has participated in 17 research projects, 10 directly with industry (Principal Investigator in 4) and has 4 patents, one that is industrially exploited and licensed to companies and a Spin-out company. Since 2009 (disclosure of prior work restricted by confidentiality agreements) he has 52 publications: 10 book chapters and 31 SCI papers (>50% with an Impact Factor >5.15, h-index = 12 with >330 citations), and is Editor of 1 RSC book entitled "The Economic Utilisation of Food Co-Products". He has contributed 35 conference papers (80% international, 4 invited lectures), and has supervised 5 Masters students (2 in Spain). Currently he represents Spain in the Management Committee of the European funded EUBIS COST Action TD1203 "Food waste valorisation for sustainable chemicals, materials & fuels".

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AYUDAS RAMÓN Y CAJAL
CONVOCATORIA 2014

Turno de acceso general

Nombre: **MUNUERA LOPEZ, CARMEN**
Referencia: RYC-2014-16626
Área Científica: Ciencia y Tecnología de Materiales
Correo Electrónico: carmen.munuera@gmail.com

Título:

Functional characterization of low dimensional systems:SPM beyond morphology

Resumen de la Memoria:

My scientific career has been developed within the Materials Science field, in the Nanoscience and Nanotechnology areas. My interest focused primarily on the study of functional materials at the nanometer scale, implying the characterization of their structural, mechanical, electrical and, more recently, magnetic properties as well as their manipulation, trying to establish structure-property relationships that allow understanding and controlling the materials at the nanoscale. I have acquired a broad knowledge in the use of the Scanning Probe Microscopy (SPM) and its different measuring modes, consolidated during my postdoctoral stage. This expertise was essential to face the recent challenge of opening and leading a new research line in my actual group, focused on the investigation of complex oxides heterostructures and 2D systems applying the SPM. In 2010 I started working on setting-up from scratch a SPM laboratory at the group headed by Prof. M García-Hernández, which actually has three fully operative SPMs systems, one working at low- and two at room-temperature.

My research activity has comprised studies on different compounds, with special emphasis on organic systems (SAMs, organic semiconductors and polymer blends) and complex oxide systems. Within the first group, I have focused on the transport characterization, and the influence that structure and morphology have on the functional properties. I have also carried out photoresponse experiments, applying the Kelvin probe microscopy technique to relate changes in the surface potential with the efficiency of charge generation. Besides the fundamental interests, these experiments help improving the efficiency of organic-based photovoltaic devices such as organic solar cells. Within the second group, I am particularly interested in the study of complex oxide heterostructures based on ferroelectric and ferromagnetic layers, and the interface coupling between the different order parameters. The use of local techniques (SPM) is a very interesting approach to both characterize and manipulate the properties of these systems. Recently, I have tackled the study of layered 2D systems, including graphene-based samples, but specially focusing on the properties of strongly 2D superconductors, with the aim to search for new surface superconducting features. We have started an systematic investigation of the superconducting properties of bulk, few layer sheets and single layers of 2D materials (particularly Bi2Pd), with the hope that the enhanced spin-orbit coupling, together with the layered structure creates appropriate conditions for a peculiar, possibly topological, band structure at the surface.

All my stages as researcher have been funded by fellowships awarded in open and competitive calls. During my trajectory I have collaborated in numerous international and national projects, with active participation in industrial-funded investigations. The impact of my research is supported by the quantity and quality of my publications and my participation in national and international conferences. My expertise in local probe characterization enabled me to establish numerous collaborations in parallel to my main research lines and deliver invited seminars on the topic. Adaptability and initiative are adequate descriptions of my scientific career that involves mobility and a variety of studied systems

Resumen del Currículum Vitae:

Dr. Carmen Munuera developed her PhD entitled "Structural, mechanical and transport characterization of organosulphur nanoscale molecular films" in the Materials Science Institute of Madrid (ICMM-CSIC), supervised by Prof. C. Ocal. She obtained the European Doctor degree with the highest qualification in 2007. Her work focused on the functional characterization of organic SAMs by Scanning Probe Microscopy (SPM). She completed her pre-doctoral formation with stays at the Université Libre de Bruxelles and the Max-Planck Institut für Metallforschung (MPI-MF) in Stuttgart. After the PhD, she worked as a postdoctoral fellow at the ICMAB-CSIC in Barcelona, within the European project "Anchoring of metal-organic frameworks, MOFs, to surfaces". In 2008 she joined department of Prof. H. Dosch at the MPI-MF in Stuttgart. She participated in the project "Towards transparent and multijunction polymer solar cells with improved optoelectronic properties" from the German Research Foundation. She also acquired experience in X-ray characterization techniques, working at the Synchrotron radiation beamline at the ANKA facility in Karlsruhe and participating in three proposals at the ESRF. The experience acquired in large-facilities experiments enabled her, in her actual stage, to participate in experiments carried out at APS and PSI synchrotrons. In 2010 she joined her actual group at the ICMM headed by Prof. M. García-Hernández. The challenge was to start a new research line on the nanoscale characterization of complex oxide heterostructures, supported by her expertise in local microscopies. She has been in charge of setting up the SPM laboratory, managing the acquisition of equipment and its installation. Nowadays she is responsible of three fully operational SPMs, one of them operating in a temperature range from 2K to 300K and with applied magnetic fields up to 9T. In 2011 she was awarded with a "Juan de la Cierva" fellowship (3rd in the Materials Science area) to continue the research on complex oxide systems, and increase the laboratory capabilities by implementing a 3-axis vector magnet system. Within her leading duties, she has supervised the project of a Master student and is actually co-supervising the PhD work of two students. All her

stages have been funded by fellowships awarded in open and competitive calls (FPU, I3P, PostDoc MEC, JaeDoc, Juan de la Cierva). During her research trajectory she has collaborated in 18 projects (11 national, 4 international and 3 industrials). She was PI of the project financed by Rhino Trade S.L. and participates in the European FET Graphene Flagship, among others. She has presented her work in national and international conferences (8 orals contributions). Her expertise in SPM enabled her to establish numerous collaborations and deliver invited seminars on the topic. She is co-author of 45 publications in prestigious journals (1 NanoLetters,1 Adv. Mat.,1 Small,6 PRB,2 PCCP, 1 JACS) with 606 cites and a h-index = 14 (Scopus). 75% of the articles are in the first quartile (Q1) and the 95% in the Q1 and Q2 categories, with an average IF=4. In 2011 she was awarded the "Young Research Prize" by the Real Academia Sevillana de Ciencias in recognition of her scientific trajectory and in 2012 she was appointed by the Royal Spanish Academy of Science for the "Young Scientists Nomination 2013" by the Global Young Academy

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Turno de acceso general

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Título:

Development of advanced materials and coatings using "near-net-shape" processing for high temperature applications

Resumen de la Memoria:

The development and design of new materials and coatings, having tailored-made bulk microstructures or surface characteristics for a specific application requires a deep understanding of the theoretical and experimental aspects that control the manufacturing or deposition process and the microstructural characteristics and properties of both substrate and coating. Near-net shape manufacturing technologies offer flexibility and reduced costs as well as the possibility of tailor-made design of structure. Using thermodynamic and kinetic software modelling packages, such as the Thermocalc and Dictra, new materials microstructures coating processes and compositions can be developed and the existing ones can be optimized.

The candidate's research experience as a whole has been focused on developing novel materials and surface coatings that can find applications in aggressive environments in various industrial sectors, using thermodynamic modelling tools and applying them to both existing materials such as Ti alloys and new materials (such as MAX phase material) and aiming towards creating tailored-made structures with the aid of advanced manufacturing techniques.

MAX phases are a group of ternary compounds with a general formula of Mn+1AXn, (being M a transition element, A an element generally of groups IIIA or IVA, X being C or N and n=1-3) which have a nanolaminated structure and unique properties such as thermal shock resistance, fracture toughness, machinability, high elastic modulus, excellent corrosion and oxidation resistance and self healing capabilities. These extraordinary properties makes them ideal for high performance applications in innovative micro-engineering systems which require high efficiency and low environmental impact with low weight components capable of working in extreme conditions. The research experience of the candidate in near-net shape processing technologies and processing of porous materials is applied for the manufacture and study of components with micro and macrocellular structure based on MAX phase materials using powder metallurgy and additive manufacturing (rapid prototyping methodologies) for applications at high temperature and aggressive environments.

In the field of surface modification, Ti-alloys and intermetallics exhibit a great potential for their application in various industrial sectors due to their attractive properties, however, a disadvantage of these materials is their poor oxidation resistance at high temperatures. Therefore there is a need for surface modification of Ti-based alloys and intermetallics for structural high-temperature applications. The approach utilised in this research line is a significant contribution to the advancement of novel materials and surface engineering processes since it takes into consideration the substrate/system interaction as well as in-service conditions and includes both theoretical analysis and experimental verification of the materials and coating processes. These research lines encompass the research experience of the candidate in the fields of surface modification, modelling of thermodynamic and kinetic processes and processing of advanced materials.

Resumen del Currículum Vitae:

Dr. S.A. Tsipas, born in 1978, received her MEng degree in Materials Science and Engineering from Imperial College (London, UK) in 2000 with First Class Honours and completed her PhD in 2005 at the Department of Materials Science and Metallurgy in the University of Cambridge, both institutions being within the top ten worldwide (according to the THES, QS, etc). The topic of her PhD thesis was "Thermophysical Properties of Plasma Sprayed Thermal Barrier Coatings". She has received the awards of Charles Salter Prize for Excellence in Metallurgy, Cambridge European Isaac Newton Studentship, Cambridge European Trust Bursary and Royal Academy of Engineering Travel Award. She has performed several placements in recognised centres, including Aristotle's University of Thessaloniki, Instituto Nacional de Tecnología Aeroespacial (INTA) and Metallurgical Industrial Research & Technology Centre. The candidate was also awarded the Marie Curie Training Fellowship to carry out research work in the Institut de Ciencia de Materials de Barcelona ICMAB (CSIC). She was a post-doctoral researcher at the Universidad Complutense de Madrid, working in several European projects in the field of surface engineering and coatings for components in power generation and aerospace sectors. In 2007 she was awarded the post-doctoral Fellowship Juan de la Cierva to work in the Universidad Carlos III de Madrid (UC3M) on the development of coatings for novel materials produced by powder metallurgy. During her research trajectory she has a published a total of 34 publications in international scientific journals with a total of 269 citations (h-index=11) without self-citations. About 59% are published in journals within quartile category Q1 in the specific knowledge area and she is the first or second author in about 53%. She is co-author in 2 patents, one of them European. She has presented 34 communications in international conferences, mostly oral contributions, including a Keynote Presentation in the 28th ICEACC, an Invited Oral presentation at the MDPTKM2013 and two prizes for posters presented in conferences (ITSC2003 and EUROMAT2005). She has presented various invited seminars at the Texas A&M University, University of Cambridge, Aristotle's University of Thessaloniki, INTA, UPM and an invited seminar organized by the ThermoCalc AB. She has participated in 23 competitive projects (6

European, 14 National and 3 Regional) and has been the principal investigator in a competitive research project funded by the Regional Government of Madrid for the creation or consolidation of new research groups/lines at the UC3M for young researchers under the age of 40. She has participated in 14 research contracts funded by companies such as Sulzer Metco, Endesa, Dayco Ensa and Hoganas. The candidate is a regular reviewer is several scientific journals in the field of materials science (Sur. Coat. Tech; Oxid. Metals; Corr. Sci.). Recently she received a congratulating letter from the rector of the UC3M for for being within the highest 13% of the personnel of the UC3M with respect to the quality of her scientific publications. Finally, she has a Positive Evaluation for the position of Profesor Titular de Universidad by the A.N.E.C.A. and has extensive teaching experience at the University of Cambridge, Aristotle's University of Thessaloniki and UC3M.

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Turno de acceso general

Nombre: **MACIA BROS, FERRAN**
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Área Científica: Ciencia y Tecnología de Materiales
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Título:

Functional spin dynamics in nanostructures

Resumen de la Memoria:

My work experience and interests are magnetism and spin-dependence electron transport (spintronics) in mesoscopic systems, magnetic quantum tunneling and coherence in nanostructures, and perturbations and dynamical systems. I believe science and technology must connect with society.
I have a degree in mathematics and a degree in Telecommunication Engineering from the Polytechnic University of Catalonia (UPC). Towards the end of my studies, I began with some research in Physics and I did my thesis degree at the Institute of Photonic Sciences of Barcelona (ICFO) on the subject of "controlling photon entanglement". My work was awarded and published with the prize Jordi Porta i Jué from the Catalan Physics Society
Next, I decided I wanted to become an experimentalist and combine my theoretical background with the most applied part of science. I began with my doctorate studies at the Physics Department of University of Barcelona (UB) with Prof. Javier Tejada. My thesis focused on studies of magnetic materials combined with microwaves and low temperatures and, in particular, I explored the discovery of a new phenomenon "Magnetic deflagration". During my Ph.D I did research stays in Florida, New York, Beijing, Hong Kong, and Berlin, I taught for 3 years core subjects at the physics degree at UB.
For my post-doctoral training I changed subjects a bit and moved to a more applied group to study spin dependent transport and magnetic properties of nanostructures at room temperature. I intended to put together ideas from biology, especially from the neuroscience, and the fabrication of magnetic nanodevices. I started my postdoctoral training at New York University (NYU) with a joint position between the Physics Department and the Courant Institute for Mathematical Science. I obtained funding for the project; first, through a BP grant from the Catalan Government and later on, through a Marie Curie action (IOF) from the European Commission.
During my post-doctoral stay at NYU (4 years), besides my work related to the Marie Curie grant, I participated and led some of the group work. I was in charge of the clean room and I mentored graduate students and international students in internships. I coordinated the work of two MURI projects; one in nanoparticles arrays and the other one on organic semiconductors.

I came back to UB in Barcelona as a part of the Marie Curie project, where I began to develop a new working line at the lab based on the study and applications of high-frequency dynamics of nanodevices. I obtained a 2-year contract through a COFUND project from the Catalan government to develop magnonic structures inspired in the human brain. I am currently leading an EXPLORA project on how to determine the integrity of implanted stents with microwaves, and I am participating in a project with Dr. J.M Hernandez on the study of magnetization dynamics (Plan Nacional project).

I have plans for scientific proposals and experiments both in basic research and in more applied fields. I believe that experimental Physics will soon benefit from developments from other fields, especially from the neuroscience. I have a strong determination to become a researcher in the Spanish system where I believe my experience and my future research may be of good use.

Resumen del Currículum Vitae:

I studied a degree in mathematics along with a degree in Telecommunication engineering at the Polytechnic University of Catalonia (UPC). I did my master's thesis at the Institute of Photonic Sciences of Barcelona (ICFO) and later on I earned my PhD in Physics at the University of Barcelona (UB) working on experimental magnetism. I did research stays in the US, China, and Germany and I taught for 3 years at UB.
As a postdoc I joined two professors at New York University: Prof A.D Kent at the Physics department and Prof. F.C Hoppensteadt at the Courant institute for Mathematical sciences. I developed an interdisciplinary project that implement biological inspired computations with nanoscale magnetic systems
During 2014 I gained a COFUND project (2 years) and I went back to UB where I'm developing my research on experimental magnetism. I'm supervising several PhD students and leading an EXPLORA project we obtained at the end of 2014. I established new collaborations with Universities and Companies in order to build synergies and have access to funding agencies.
My CV highlights would be:
- Publication of over 30 manuscripts in peer reviewed journals having an h index of 13 (google scholar). In the year 2014, among my publications I am the leading author of two manuscripts published in Nature communications and Nature Nanotechonlogy.
- Large number of invitations to speak in conferences, workshops and seminars (more than 15 invitations and 5 during 2014). I contributed

with over 40 talks in conferences and workshops.
- International collaborations and research stays: I performed a large number of pre and post-doctoral research stays, which allowed me to build a strong network of outstanding collaborators in different fields: 5 during my PhD, 4 years post-doc at New York with stays at Cornell university and Standford. I am currently collaborating with more than 5 different international organizations
-Participation in mentoring and teaching: direction of a PhD thesis (3 currently); co-direction of master students and internships (3 at NYU, 2 at UB) and teaching at undergraduate level (UB).
- Leading capacity: I have participated and led several projects and initiatives at different levels: Participation in 3 plan nacional projects from the Spanish Government, leading a part of 2 MURI projects from the Army Research Office in the USA. Leading a Marie Curie action IOF, managing 2 synchrotron proposals, and managing two nanofabrication proposals. During the last year I'm leading an EXPLORA project from the Spanish government and I have applied to different initiative both at European and national levels.
-Other merits: I'm involved in evaluating and reviewing proposals and manuscripts. I have reviewed about 30 manuscripts and proposals in the last 3 years, including manuscripts in major journals (Nature and Phys. Rev. Letters) and proposals in National Labs.

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Turno de acceso general

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Título:

Design, engineering and assessment of hybrid nanostructured materials using high pressure technology for life science applications

Resumen de la Memoria:

Conventional production of nanostructures has severe limitations of product purity, operating conditions and structure control. The main research line of the candidate focuses on the development of a technological platform based on the use of high pressure technology, mainly supercritical (sc)CO2 technology for the engineering of hybrid and composite nanostructured materials to be applied in life sciences.

The first challenge of the research is the design of organic-inorganic nanostructures with controlled composition in two steps:
1st) A process of surface functionalization (sc-silanization) of inorganic nanoparticles (NPs) was developed to improve their dispersion in organic matrices. This process allowed an unique silane monolayer coating of individual inorganic NPs. Data obtained during the process development (solubility studies, process kinetics modelling, screening of operating conditions) provided enough information for the engineering control of the degree (partial or complete) and quality (monolayer or multilayer) of the silane coating and for the implementation of the process to other inorganic NPs/silane pairs.
2nd) Bottom up-approaches using sc-fluid technology were engineered for the production of hybrid materials with isotropic properties containing the sc-silanized NPs (i) for regenerative medicine: production of fibers or micronized particles composed by a nanometric mineral oxide core embedded in a polymeric matrix; and (ii) for the topical administration route: production of micronized solid lipid particles formed by the assembly of a lipid matrix, a bioactive agent and an UV- blocker.

The second challenge is devoted to the design of composite and hybrid materials with controlled porosity and morphology using sc- and high pressure technology:
1) Design of macroporous materials: Synthetic implants acting as biodegradable 3D-constructs with tailored properties were prepared using scCO2 as a porogenic agent (sc-foaming) and as a sintering agent of polymer microparticles (sc-sintering). The scaffold would guide and promote tissue growth or even deliver bioactive substances.
2) Design of mesoporous materials: The modelling of the sc-drying of gels unveiled the mass transfer mechanisms governing the drying profile and set the basis to optimize the process. The resulting material (aerogel) is a highly porous, lightweight drug carrier, able to provide enhanced drug bioavailability and loading capacity for oral administration. First-in-class aerogels from different sources (polysaccharides, polymers, proteins) were initially processed and characterized by the candidate for pharmaceutical purposes and then extended to functional foods and biomedical uses among others. An aerogel developed by the candidate for building thermal insulation purposes is currently commercialized by BASF.
3) Design of microspheres: an innovative emulsion-gelation process was developed by the candidate for the preparation of microspherical polysaccharide aerogels. Processing parameters governing particle size and porosity were identified and materials applied to delivery systems. In a different embodiment, research, development, scale-up and industrialization of polymeric materials based on emulsion-polymerization under high pressure conditions were conducted by the candidate resulting in a novel micrometric material launched to the market by Solvay.

Resumen del Currículum Vitae:

After finishing MSc in Chemical Engineering (University Santiago de Compostela, USC, 2003) and MSc in Chemistry (USC, 2005), he started his PhD at the Institute of Materials Science of Barcelona (CSIC) with Dr. Domingo, funded by a I3P fellowship from CSIC. The research focused on the design of nanostructured hybrid materials using supercritical fluid technology. During his PhD he accomplished three pre-doctoral stays (Imperial College London -UK-, CNRS -France- and IBET -Portugal-). In December 2009, he got his PhD Chemical Process Engineering (Technical University Catalonia, UPC), being awarded with the highest distinction and the Extraordinary Prize of Doctorate. This period gave rise to 24 SCI-articles and was recognized with the 2nd PhD Thesis on Polymers Prize by the Spanish Royal Society of Chemistry. After a Postgraduate in Innovation Management (Autonomous University of Barcelona) in 2010, he applied the acquired skills in the valorisation of his PhD thesis being finalist of the contest "8th Edition of European Hopefuls for Innovation Award".

In June 2010, he joined the Institute of Thermal Separation Processes (Prof. Smirnova, Technical University of Hamburg, Germany) a renowned international reference group in high pressure process engineering. He was awarded with a postdoctoral mobility grant EX2009 from the Spanish Ministry of Education. During 27 months, he led the "Nanoporous Materials" group aimed at the development of aerogels with a main focus on life sciences applications. He was in charge as the project leader for the development of an aerogel for

thermal insulation purposes, which is currently in the market commercialized by BASF. In 2012, he moved to a top-10 chemical company (Solvay, Belgium), as an R&D&T engineer focused on the design, scale-up and industrialization of materials using high pressure technology. During this 20-month industrial period, he implemented operational excellence initiatives in chemical plants to reduce operating costs, actively worked with suppliers and clients for product development, and was the person in charge for the industrialization of a polymeric material for high-tech floors. In 2014, he was awarded with a Juan de la Cierva fellowship from the Spanish Ministry of Science and Innovation to support his research on the design of biomedical materials using high pressure technology at the I+D Farma group (USC) led by Profs. Alvarez and Concheiro.

He has worked in 10 research institutions from 6 different countries where he has established an extensive worldwide network. He conducted research in close contact with academic and industrial partners in the frame of 20 projects funded by the European Union (2) and Spanish (6), German (3) and regional (3) governments and private (6) companies. He published 35 SCI-articles with high impact factor (25 articles in Q1 journals) and several book contributions and supervised 16 minor thesis. He has received 498 citations, a h-index of 15 and he is first author of 17 articles (13 as corresponding author). He presented his work in 51 reviewed-before-acceptance international conferences. He regularly acts as a referee of ACS, Elsevier and Nature journals in the area of materials science and engineering and got a "Certificate of Excellence in Reviewing" by the Journal of Supercritical Fluids (Elsevier, 2013).