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CONVOCATORIA 2018

Turno de acceso general

Nombre: SANTOS ALEJANDRO, ABEL
Referencia: RYC2018-024610-I
Área Temática: **Ciencias y tecnologías de materiales**
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Título:

Structural Engineering of Nanoporous Materials

Resumen de la Memoria:

Capacity and leadership in research

Since my PhD was awarded in 2011, I have generated high quality research outputs, secured competitive grant research funding, and built research infrastructure (>$2.3M). I have secured, either solely or in collaboration, funding for 8 projects, including one DECRA, one Discovery Project (as postdoc), two LIEFs, one Spanish National R&D Project, one UoA Research for Impact Fellowship, and one Australian APRIL R&D project.

Research outputs

I have demonstrated the ability to conduct high quality multi-disciplinary research at the interface of several fields, including nanofabrication (16%), nanomedicine (18%), membrane science (8%), photocatalysis (8%), optical sensing and biosensing (25%), and photonics (25%). For a researcher in my fields at my career stage, I have an outstanding publication track record: 5 books (2 as sole author, 2 as co-author, and one as editor), 8 book chapters, 85 research articles (30 first author; 62 corresponding author; 24 senior author). I have published an average of 12 papers per year, with an average IF of 6.2. My publications have received over 2130 cites, with an h-index of 29 (Google Scholar, GS), a Category Normalized Citation Impact of 1.86 (InCites), and a Field Weighted Citation Impact of 1.3 (Scival). Since 2014, I receive an average of ~400 citations per year with an increasing trajectory. 50% of my work has been published in the top 10% journals of the materials science discipline (Scival) and ~50% of these in journals with IF >6. I have been corresponding author on 75% of these publications, which demonstrates my leadership and genuine contribution to science. My work has been featured in 2 hot papers, 12 invited articles, and 5 journal covers, which indicates the impact of my research. My research has been published in prestigious and high-impact journals, including Adv Mater (2 articles IF 22.0), Adv Funct Mater (1 article IF 13.3), Nanoscale (9 articles IF 7.2), ACS Appl Mater Interfaces (16 articles IF 8.1), Anal Chem (5 papers IF 6.3), J Mater Chem B & C (5 articles IF 4.5 & 6.0), and Biomaterials (2 papers IF 8.4).

Research training, mentoring and supervision

I have been mentored and supported by world-leading and distinguished professors: L Marsal (ICREA Prof., URV, Spain), J Bachmann (Friedrich Alexander University, Germany), K Nielsch (Director, Leibniz Institute of Solid State and Materials Research, Germany), A Evdokiou (Michell-McGrath Fellow, UoA), A Abell (Node Director, ARC CoE for Nanoscale BioPhotonics CNBP, UoA), S. Qiao (Laureate Fellow, UoA), and N Voelcker (Director, Melbourne Centre for Nanofabrication MCN, Monash). I have developed my supervision and leadership skills with the support of UoA through a series of Supervision and Leadership courses. Though still an early mid-career researcher (PhD in 2011), I have supervised 8 PhDs (2 as principal and 6 as co-supervisor), including 5 PhD completions (5 Dean s Commendations and 2 medals), 6 masters, 21 honours, and 15 summer school students.
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Resumen del Currículum Vitae:

I was awarded my PhD in electronic engineering 8 years ago (2011) and have experienced no career interruptions. I have pursued an independent research leadership role in nanofabrication, photonics, drug delivery, nanotoxicity, membrane science, photocatalysis, and optical sensing and biosensing. I have held full-time research-only positions since my PhD by the Rovira i Virgili University (URV, Spain). After a postdoctoral research position (2011 12) at the Department of Electronic, Electric and Automatised Engineering (URV), I undertook a postdoctoral research position (academic Level A) associated with an Australian Research Council (ARC) Discovery Project in the School of Chemical Engineering at the University of Adelaide (UoA, Australia) in January 2012. I secured an ARC DECRA (2014 16) [equivalent to an ERC Starting Grant], and took up a Level B position in January 2014 in the School of Chemical Engineering (UoA). In September 2015, I was promoted to research-only Level C position by the Faculty of Engineering, Computer and Mathematical Sciences (ECMS, UoA). In 2016, I gained a competitive Research for Impact Fellowship (2017 19) (success rate ~10%) by UoA in recognition of outstanding research performance during the DECRA (42 articles, two books, four book chapters, and four PhD completions of which I was principal supervisor for one, and took the primary role for three; all completions gained Dean s Commendations and two UoA medals).

My current role at UoA s School of Chemical Engineering incorporates research (75%), administration (10%) and teaching (15%). Currently

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I lead a dynamic research group comprising three PhDs (two as principal supervisor and one as co-supervisor), one masters (principal supervisor), two PhD visitors and four honours students, and have a research laboratory for my group. I am actively involved in teaching, and currently I coordinate and lecture for the Masters in Materials Engineering and the undergraduate Materials Science and Engineering III.

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Turno de acceso general

Nombre: NAVARRO MORATALLA, EFREN ADOLFO
Referencia: RYC2018-024736-I
Área Temática: **Ciencias y tecnologías de materiales**
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Título:

Diseño y síntesis de cristales para el estudio de estados emergentes en sistemas fuertemente correlacionados

Resumen de la Memoria:

Efrén Navarro Moratalla comenzó sus estudios en Ciencias Químicas en la Universidad de Valencia donde ya desde el principio se inició en la investigación gracias a los programas de alumnado interno (Departamento de Bioquímica, 2003-2004) y a varias prácticas en los departamentos (Química Orgánica, 2005; Instituto de Ciencia Molecular, 2006). Sin embargo, la primera inmersión en la investigación real fue durante una estancia anual que realizó en el Department of Chemistry de la University of Cambridge (UK), donde tuvo ocasión de profundizar en la química inorgánica sintética. Recibió la Licenciatura en Química por la Universidad de Valencia en el año 2007, siendo Premio Extraordinario Fin de Carrera (Universidad de Valencia) y Premio al Rendimiento Académico de la Generalitat Valenciana.

Esta estancia serviría asimismo de motivación para continuar la carrera investigadora en España. Ya graduado, la incorporación de Efrén a la investigación fue inmediata en el equipo del Prof. Eugenio Coronado en el Instituto de Ciencia Molecular. Aquí comenzó su interés por la ciencia de los materiales y la caracterización de las propiedades físicas de los sólidos sintéticos. Poco después fue otorgado una beca de Formación de Profesorado Universitario (Ministerio de Ciencia e Innovación, España) y centra sus estudios doctorales principalmente en el área de los materiales inorgánicos y los materiales 2D, haciendo hincapié en el estudio de la intercalación de materiales híbridos y de sus propiedades físicas. Obtiene primero un Master en Nanociencia y Nanotecnología (2009) y finalmente el doctorado cum laude del mismo nombre (2013). Su tesis en materiales 2D recibiría el Premio Extraordinario de Doctorado (Universidad de Valencia 2014).

Tras la etapa pre-doctoral, las distintas facetas de los materiales 2D centran ya todo el interés científico del candidato. Contando ya con una amplia base en química sintética y ciencia de los materiales, decide completar su perfil multidisciplinar abordando los aspectos más físicos de la materia condensada de baja dimensionalidad. Realiza un breve periodo post-doctoral en el ICMol estableciendo una colaboración con físicos del Kavli Institute of Nanoscience en TU Delft (Países Bajos) para explorar los superconductores 2D y más tarde un segundo post-doc en el grupo del Prof. Pablo Jarillo-Herrero en el Massachusetts Institute of Technology, reconocido por el transporte electrónico en materiales 2D. Esta estancia será clave en su trayectoria, pues le ayuda a establecer vínculos entre los aspectos físicos y químicos de la materia condensada. Efrén interacciona con físicos de primer nivel y participa en consorcios multidisciplinares con retos tecnológicos vigentes (como la realización de superconductividad topológica en sistemas 2D) y un claro compromiso social, fomentando la visibilidad a través de institutos y museos (Boston Museum of Science). Es entonces cuando el candidato emprende una línea de investigación sin precedente en los materiales 2D: los materiales 2D magnéticos.

En 2017 inicia su etapa de reincorporación al sistema español en el ICMol como investigador principal de diversos proyectos entre los que se encuentra uno financiado por La Generalitat Valenciana, uno por la fundación la Caixa y una ERC Starting Grant de la Comisión Europea, centrados en el estudio de la física en nuevos materiales cristalinos.
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Resumen del Currículum Vitae:

Efrén Navarro Moratalla es un investigador del Instituto de Ciencia Molecular (ICMol) que desempeña su actividad científica multidisciplinar en la frontera entre la química, la ciencia de los materiales y la física de la materia condensada, con especial interés en los sistemas de baja dimensionalidad.

Obtuvo el grado de Licenciado en Química (premio extraordinario de licenciatura y premio al rendimiento académico, 2007) por la Universidad de Valencia y más tarde el de Máster en Nanociencia y Nanotecnología (premio extraordinario de master, 2009) y el de doctor en la misma disciplina (cum laude, premio extraordinario de doctorado, 2013) por la misma universidad. Posteriormente, la realización de una estancia postdoctoral en el departamento de física del Massachusetts Institute of Technology (MIT) terminaría completar su perfil multidisciplinar con la física de la materia condensada. Aquí recibiría el galardón Infinite Kilometer por su trayectoria en el MIT.

Hasta la fecha, el candidato ha publicado 29 artículos de investigación tipo peer-reviewed en revistas científicas de alto impacto en química, física y ciencia de los materiales (media de número de citas por artículo > 38, factor h de 17 según Google Scholar) y ha patentado 2 tecnologías para la producción de materiales 2D (una de las cuales recibió el primer premio IDEA en energía y medioambiente del Ayuntamiento de Valencia). Asimismo, ha impartido una quincena de charlas orales en conferencias nacionales e internacionales, cinco de ellas siendo ponencias invitadas (ESMolNa 2013, 2017, 2018; X GEFES Simposium 2018; SPIE Spintronics XI) y también recibiendo invitaciones a impartir diversos seminarios en instituciones científicas de renombre internacional (Ciudad Politécnica de la Innovación

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2012, Valencia; Instituto de Tecnología Química 2017, Valencia; CIC nanoGUNE 2018, San Sebastián; Queens University Belfast 2018).

Es importante destacar la participación del candidato en proyectos y consorcios de investigación tanto a nivel nacional como internacional (principalmente en Estados Unidos: Harvard University y MIT) y en sociedades científicas nacionales y extranjeras y comités de evaluación de artículos científicos en editoriales de prestigio (Nature Publishing Group, American Physical Society, American Chemical Society). Más recientemente el candidato se inició en la organización de reuniones científicas con la creación del primer foro de discusión sobre física journal club del ICMol (actualmente en su segunda edición).

También cabe resaltar su labor docente investigadora en la tutela de varios estudiantes de doctorado en el MIT y la co-dirección de dos tesis de máster en el ICMol. En la actualidad supervisa la realización de una tesis de master y de un doctorando en su grupo de reciente creación dentro del ICMol.

Finalmente, destacar la capacidad del candidato de autofinanciar su investigación a través de convocatorias competitivas a lo largo de toda su trayectoria investigadora desde su etapa predoctoral (beca Erasmus 2006, beca FPU 2008), pasando por la postdoctoral (Fundación Ramón Areces) y hasta la etapa actual como investigador principal. En esta última etapa destaca la obtención de tres proyectos de investigación a distintos niveles: regional con el SEJI 2017 (Generalitat Valenciana), nacional con La Caixa junior leader 2017 y europeo con un ERC Starting Grant.

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Nombre: CAZORLA SILVA, CLAUDIO
Referencia: RYC2018-024947-I
Área Temática: **Ciencias y tecnologías de materiales**
Correo Electrónico: c.cazorla@unsw.edu.au

Título:

Multicaloric Materials for Ambient Solid-State Cooling

Resumen de la Memoria:

My research involves the theoretical study of multiferroic and fast-ion conductor materials for nanoelectronics and energy storage and energy conversion applications. In my investigations, I use advanced quantum and classical simulation methods (e.g., density functional theory, random-phase approximation, and reactive force fields). A brief summary of my main research line "Multicaloric Materials for Ambient Solid-State Cooling" is provided next.

Conventional cooling methods are mostly based on compression of greenhouse gases which, in addition to the obvious environmental threats, present two critical drawbacks: 1) the energy efficiency of the refrigeration cycles is low (<60%), and 2) the scalability of refrigeration devices is very limited. The ~1.4 billion domestic refrigeration units in the world account for about 15% of total domestic energy consumption, or equivalently, annual CO2 emissions of 450 million tons; the potential impact of even modest energy efficiency improvements, therefore, is enormous. Meanwhile, for microchips to perform optimally, compact and efficient refrigeration solutions are required to remove the Joule-generated heat; micro-sized coolers operating at ambient conditions, therefore, are pressingly needed for successfully engineering the next-generation of electronic devices.

Solid-state cooling is an energy efficient technology that exploits the adiabatic activation/relaxation of an order parameter in a crystal through the application/removal of an external field (electrical, magnetic, or mechanical). Solid-state cooling energy efficiencies of ~75% have been already demonstrated and further improvements are within reach. Solid-state refrigerators also are highly sought after for implementation of novel on-chip cooling technologies since they can be easily scaled down to transistor sizes. However, most caloric materials known to date can achieve only modest refrigeration spans and/or operate at temperatures different from ambient conditions. Consequently, the development of practical solid-state cooling applications remains limited.

The overarching aim of this research line is to drastically improve solid-state cooling at room temperature through the rational design of caloric materials. This can be achieved by tuning to ambient conditions multiple phase transitions occurring in nano-engineered multifunctional materials. In a nutshell, efficient solid-state cooling at room temperature can be achieved by applying nano-engineering concepts (i.e., thin film and superlattice geometries along with rational chemical doping) to multifunctional materials (e.g., multiferroics and fast-ioin conductors). Via nano engineering we can set to ambient temperature multiple order-parameter transitions, thus rendering multiple and giant caloric responses.

My research line involves several complementary methodologies:
(1) Simulation of multifunctional nano-materials under external fields at finite temperatures
(2) Design of nano-engineered multifunctional materials for solid-state cooling
(3) Synthesis of multicaloric nano-materials and measurement of their cooling performance (this part is performed in collaboration with experimental colleagues in UNSW Sydney, Polytechnic University of Catalonia, and University of Barcelona)
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Resumen del Currículum Vitae:

I am a Senior Lecturer / ARC Future Fellow working in The University of New South Wales (Sydney, Australia). My research expertise is on the application and development of quantum and classical computational techniques for the design and understanding of multifunctional materials. In recent years, I have focused my research on the study of multiferroics (e.g., bismuth ferrite) and fast-ion conductors (e.g., silver iodide and lithium-based materials) for applications in Nanoelectronics (e.g., information storage) and Energy Storage and Conversion (e.g., solid-state batteries, hydrogen storage, and solid-state cooling).

My publication record includes 78 refereed journal articles, which have attracted a total of ~1,300 citations (Google Scholar) and h-index of 20. My publication portfolio includes 15 works published in high impact factor (IF) journals (IF > 8.0), of which 12 have been published in the last three years. Specifically, 1 Reviews of Modern Physics (IF: 36.9), 3 Physical Review Letters (IF: 8.5), 3 Nature Communications (IF: 12.4), 1 Nano Letters (IF: 12.1), 2 Science Advances (IF: 11.5), 1 Coordination Chemistry Reviews (IF: 14.5), 1 ACS Nano (IF: 13.2), 2 ACS Applied Materials & Interfaces (IF: 8.1), and 1 Chemistry of Materials (IF: 9.9). I am the first and/or corresponding author in ~ 90% of my published works.

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In the last 5 years, I have led 6 research projects and raised about 950,000 euros in funding. Likewise, I have been granted several fellowships (JAE-DOC and ARC Future Fellowships) and awards (a Postgraduate Supervision Award, and several visiting and collaboration grants). I am the leader of a computational research group composed of 4 PhD and 2 Master students. My current teaching activity consists in supervising final-year undergraduate students performing research projects, and lecturing courses on the Bachelors of Nanotechnology and Materials Science and Engineering in UNSW Sydney.

I am a member of the Australian Pawsey Energy and Resources allocation committee; my main duties involve the assessment of supercomputer allocation applications related to projects that fall within the areas of energy and energy resources. I am also a member of the European PRACE (partnership for advanced computing in Europe) infrastructure committee. Currently, I am Editor of the Crystals journal (Crystalline Materials section, IF: 2.1), ranked 14/26 (Q2) in Crystallography ; recently, I have also acted as Guest Editor for the Frontiers in Chemistry journal (IF: 4.2) in the special issue The Role of Non-Stoichiometry on the Functional Properties of Oxide Materials .

Because of the significance and impact of my research, I have been invited to present a total of ~40 contributions in international conferences; to cite some examples: Materials Research Society Spring Meeting, American Physical Society March Meeting, and Fundamentals Physics of Ferroelectrics and Related Materials. I have participated in the organisation of the following workshops and conferences: Workshop on Machine Learning in Materials Science (July 2018, Sydney, Australia), Australian Symposium on Computationally Enhanced Materials Design (July 2018, Sydney, Australia), Wagga 2017 - 41st Annual Condensed Matter and Materials Meeting (February 2017, Wagga Wagga, Australia), and Advanced Materials Meeting 2017 (October 2017, Osaka, Japan).

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Turno de acceso general

Nombre: POLAVARAPU , LAKSHMINARAYANA
Referencia: RYC2018-026103-I
Área Temática: **Ciencias y tecnologías de materiales**
Correo Electrónico: pln1002000@gmail.com

Título:

Shape controlled synthesis of perovskite nanocrystals with tunable optical properties for light-emitting devices

Resumen de la Memoria:

The applicants main research line has always been focused on development of coloidal nanocrystals (plasmonic and semiconductor perovskite nanocrystals for sensing and light emitting device)

Research work carried out during his PhD period: Synthesis of metal nanoparticles and their application to optical limiting, surface enhanced Raman scattering and printable electronics.

Research work carry out during Postdoctoral stay at University of Vigo and CICbiomaGUNE, Spain: Main research line of the applicant was on synthesis and applications of plasmonic nanoparticles for Surface enhanced Raman scattering based sensors and catalysis In the group of Prof. Luis Liz Marzan group (together with Prof. Jorge Pérez-Juste and Prof. Isabel Pastoriza-Santos) , I have developed a general synthesis method for shape control of hollow nanoparticles via galvanic replacement reaction and explored the mechanism of shape transformation by 3D tomography. Besides, I have introduced a new concept for making SERS substrates based on "pen-on-paper" approach using nanoparticle inks. Furthermore, I have introduced a new approach for making recyclable catalysts based on nanoparticle loaded paper. Most of the results have been published in reputed journals such as J. Am. Chem. Soc., Nano Lett., Small, Chemistry of Materials and many more. In total ~20 articles have been published during 3-yeear postdoc stay in Spain.

Selected publications:

1. G. Goris, L. Polavarapu, S. Bals, Gustaaf Van Tendeloo and L.M. Liz-Marzan (2014): Monitoring Galvanic Replacement Through Three-Dimensional Morphological and Chemical Mapping. Nano Lett., 2014, 14, 3220 (Equally contributed)

2. L. Polavarapu,* D. Zanaga, T. Altantzis, S. Rodal-Cedeira, I. Pastoriza-Santos, J. Pérez-Juste, S. Bals, Luis M Liz-Marzán, Galvanic replacement coupled to seeded growth as a route for shape-controlled synthesis of plasmonic nanorattles, J. Am. Chem. Soc., 2016, 138, 11453 (* corresponding author)

3. L. Polavarapu*, A. La Porta, S.M. Novikov, M. Coronado-Puchau, L.M. Liz-marzán (2014): Pen-on-paper Approach Toward the Design of Universal Surface Enhanced Raman Scattering Substrates , Small, 2014, 140, 3065 (* corresponding author)

Research work carry out in Germany for the last 4 years:

During the last four years of stay in germany initially as Humboldt fellow and later as a group leader, he has been working on the shape-controlled synthesis of perovskite nanoparticles for tunable light emission across the whole visible range. His sub-group have worked on fundamental understanding of thickness-dependent optical properties of perovskite nanoplatelets and the origin of radiate and nonradiate decay mechanims.

1) Perovskites have greatly attracted recently owing to their high power conversion efficiency photovoltaics. On the other hand, nanocrystalline perovskites have found to be promising for light emitting applications due to their high fluorescence quantum yields. I have started working on perovskite nanocrystals in 2015 in the group of Prof. Feldmann. We have already made a significant contribution to this field with some important works that have been published in reputed journals.

https://www.phog.physik.uni-muenchen.de/people/project-leaders/polavarapu_lakshminarayana/publications/index.html

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Resumen del Currículum Vitae:

Dr. Lakshminarayana Polavarapu obtained his PhD training on the synthesis and physical chemistry of Plasmonic nanocrystals (NCs). He acquired knowledge on various optical spectroscopy techniques such as single particle scattering, nonlinear absorption, and femtosecond pump-probe spectroscopy. During a postdoc in the CICbiomaGUNE, the applicant extended the shape-controlled synthesis of Plasmonic NCs toward the development of surface enhanced Raman scattering (SERS) applications. Currently, Dr. Polavarapu is as a sub-group leader

in the chair for photonics and optoelectronics at the LMU Munich, Germany. In addition, he is an extraordinary member at the Center for Nanoscience (CeNS), Munich and a Co-PI of Bavarian SolTech consortium. His research work is focused on the shape-controlled synthesis and self-assembly of highly luminescent perovskite NCs for light-emitting applications. He is currently supervising 2 PhD and 2 maters students, and 2 postdocs at the LMU Munich.

Dr. Polavarapu obtained his Ph. D. in the Department Chemistry at the National University of Singapore in 2011 under the guidance of Prof. Xu Qing-Hua. As part of his PhD thesis, he has worked on various aspects of plasmon enhanced optical studies such as plasmon enhanced fluorescence, Plasmon enhanced photocatalysis, surface enhanced Raman scattering and electronic applications of metal nanoparticles. The applicant s PhD thesis has been recommended for the best graduate thesis award of the year 2011 by the thesis examination committee.

After completion of the applicants PhD in 2011, he moved to Spain for his postdoctoral research in the group of Prof. Luis M Liz Marzan at University of Vigo and CICbiomaGUNE, where he has worked on the shape-controlled synthesis of metal nanostructures and their application to surface enhanced Raman scattering and catalysis. He has developed the synthesis of novel porous plasmonic NCs and understands the growth by using electron tomography. He has also developed low-cost SERS substrates for practical applications. The results of his postdoctoral work have been published in high impact journals and received acclaims from various research groups. Additionally, he has supervised 2 PhD students unofficially during his postdoctoral research stay in Spain (Contact reference: Prof. Luis M Liz-marzan and Prof. jorge-perez-juste)

In March 2015, Dr. Polavarapu was awarded an Alexander von Humboldt fellowship and he moved to Germany to work in the chair for photonics and optoelectronics group lead by Prof. Jochen Feldmann, where he has been working on the shape-controlled synthesis and self-assembly of highly luminescent perovskite nanocrystals for optical applications. He has been promoted to a sub-group leader position in 2017. His research results have been published in reputed journals. In total, he has published 63 articles with over 4600 times cited and an h-index of 41. He is a Guest Editor for an upcoming themed issue on perovskite NCs to be published in RSC journal Nanoscale . He has given several invited lectures, oral and poster presentations at various places. Dr. Polavarapu is seeking to apply his knowledge on shape-controlled synthesis to the development of lead-free perovskites for the development of light emitting devices.

https://www.phog.physik.uni-muenchen.de/people/project-leaders/polavarapu_lakshminarayana/index.html

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Turno de acceso general

Nombre: ETACHERI , VINODKUMAR
Referencia: RYC2018-025893-I
Área Temática: **Ciencias y tecnologías de materiales**
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Título:

Electrochemical Energy storage

Resumen de la Memoria:

I started my research career in 2006 as a Research Fellow at Center for Materials for Electronics Technology (CMET, Govt. of India) working on piezoelectric nanomaterials. Novel compositions of PZT based piezoelectric nanopowder compositions were developed during this period for pressure sensor application. I received PhD from Dublin Institute of Technology-Ireland (funded by EU-FP6 programme) in 2011. This work resulted in the development of novel narrow band gap visible-light active TiO2 photocatalysts for antibacterial application. After the completion of PhD studies, I moved to Bar Ilan University-Israel as a Postdoctoral Fellow to work in the area of electrochemical energy storage under the guidance of Prof. Doron Aurbach. During this time, I worked on Si-nanowire materials for Li-ion batteries and various aspects of Li-O2 battery technology in collaboration with Stanford university-USA and BASF-Germany. This work resulted in the commercialization of Si-nanowires in Li-ion batteries, and produced key findings related to oxygen reduction electrochemistry in Li-O2 batteries.

After 2 years of research in Israel, I was offered UMEI-PISET Postdoctoral Fellowship to join Department of Chemistry at University of Michigan, USA. This work under the guidance of Prof. Bart Bartlett resulted in new methods for the synthesis of TiO2-B and its hybrid nanostructures for energy storage. After the tenure of this fellowship, I was offered a Research Associate position at Purdue University School of Chemical Engineering under the guidance of Prof. Vilas Pol. During this period, I have invented several methods to overcome the drawbacks of high-capacity transition metal oxide Li-ion battery anodes. Other achievements include fabrication of novel electrode materials and electrolyte compositions for Na-ion and Li-S batteries. This research resulted in the filing of 6 US patents and 5 high-impact journal publications. I was actively involved in several academic and industrial projects throughout my PhD and Postdoctoral research.

In August 2016, I was offered a Researcher position at IMDEA Materials Institute to start and lead a new Electrochemistry research group. Research activities of the electrochemistry group can be divided into 3 main areas: (1) Electrochemical energy storage systems (2) Nanoscale engineering of electrode materials and (3) Tailored interfaces for efficient charge storage.

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Resumen del Currículum Vitae:

I am currently a Researcher and head of the Electrochemical Energy Storage group (1 Postdoc, 5 PhD students) at IMDEA Materials Institute. My research primarily focuses on the development of functional electrode materials and interfaces made up of nanostructured building blocks that combine the desired performance and safety for electrochemical energy storage systems (Li-ion, Na-ion, Mg-ion, Mg-Na/ Mg-Li hybrid, Li-S, Li-O2 batteries and Na-ion hybrid capacitors). Engineering of these electroactive materials across multiple length scales, tailoring of the interfaces and electronic properties on a molecular scale enabled their scalable synthesis and efficient energy storage. Another key aim of my research is the development of advanced energy storage devices combining several advantages (such as high capacity, power density and long cycle-life) through developing new electrochemistries.

I have been active in materials science research for the last 14 years, carrying out research in 5 countries (Spain, USA, Israel, Ireland and India) in three continents, working with reputed scientist in the field (e.g. Prof. Doron Aurbach, Prof. Bart Bartlett, Prof. Prof. Vilas Pol, Prof. Suresh Pillai). My background has a good balance of fundamental research, interaction with industry, academic supervision and teaching.

I have co-authored ˃45 publications including 30 journal papers (20 as first author and 8 as corresponding author), 6 book chapters, and 10 conference proceedings with currently >5700 citations and an h-index of 18. Quality has been prioritised over quantity, as reflected in the journals where these publications have appeared: ACS Nano (1), Energy Environ. Sci. (1), Adv. Energy. Mater. (1), Adv. Funct. Mater. (1) and J. Photochem. Photobiol. C (1) with impact factors in the range 10-25. Other publications in highly reputed more specialised journals but still of high impact factor (up to 10) include Chem. Mater. (1), J. Mater. Chem. A (3), Inorg. Chem. (1), Langmuir (2), ACS Appl. Mater. Interfaces (4), J. Phys. Chem. Lett. (1), Environ. Sci. Technol. (1), ACS Sustainable Chem. Eng. (1), J. Mater. Sci. Mater. Electron. (1). Two of my recent Works have been featured as cover pages in high-impact international journals and another (paper on rechargeable Li-ion batteries received more than 3200 citations (Top ten most read article during 2011-2018).

Three of my recent publications are featured in several highly reputable medias such as Forbes magazine, USA Today, Smithsonian magazine and Scientific American. My PhD work funded by EU-FP6 programme, and postdoctoral research in the area of energy storage and conversión materials resulted in the filing of 8 US and EU patents. Several of these technologies attracted substantial interest from industry. I am currently collaborating extensively with several National Laboratories, Universities and industrial partners around the world for developing and commercializing a number of energy storage materials and technologies. The international reputation of my work has been reflected in invitations to various international conferences and research centers, and in the organization of international conferences. This combination of academic work and industrial links enabled me to secure Juan de la Cierva Fellowship 2016 from Spanish Ministry of Economy and Competitiveness (MINECO), and Talent attraction fellowship 2016 from Madrid regional government to join

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Turno de acceso general

Nombre: ARTEAGA BARRIEL, ORIOL
Referencia: RYC2018-024997-I
Área Temática: **Ciencias y tecnologías de materiales**
Correo Electrónico: oarteaga@ub.edu

Título:

Optical characterization of natural and artificial chiral materials with polarized light

Resumen de la Memoria:

My research career initiated in 2005 when I started my PhD in Physics at the University of Barcelona (Department of Applied Physics and Optics). I was funded by a FPU predoctoral fellowship from the Spanish MEC. My thesis work was focused on the experimental study of chirality in large molecular aggregates and crystals. In 2008 my doctoral work was reinforced by a pre-doctoral stay at the Oak Ridge National Laboratory (USA) where I worked in the determination of optical constants of materials using generalized ellipsometry. I obtained my PhD in Physics in October 2010. I received two awards for his PhD work: the extraordinary PhD award prize by University of Barcelona, and a prize from the 16th Award of the Council of Doctors of the same university.As a post-doctoral researcher, I worked in France (2 month at the École Polytechnique) and USA (27 month at the Molecular Design Institute in New York University). In this period, I participated in several international research projects, among which, I highlight the participation in the Goali NSF-funded project Chiroptical anisotropy . In this project I developed a research instrument (Appl. Opt. 51, 6805-6817, 2012) that won a prestigious 2013 R&D100 award that lead to the commercialization of a research instrument (150XT Mueller polarimeter) currently sold by Hinds Instruments . The research line about crystal polarimetry I started in New York University has become an important part of the research done in the group of Prof. Bart Kahr and currently there are three PhD students working on that research line.

My pre-doctoral and post-doctoral scientific achievements allowed me to obtain first a Beatriu de Pinós Fellowship and, later, an IIF Marie Curie Fellowship (Nanochirality, FP7-PEOPLE-2012-IIF) to reincorporate to the European research system that allowed me to secure my own funding for research and training. During this period I focused my research interests in the optical analysis of artificial metamaterials (e.g. Opt. Exp., 22, 13719-13732 2015, Opt. Express, 24, 2242-2252, 2016) and developed a new instrument for polarimetric analysis with micrometric resolution (Appl. Opt. 53, 2236-2245, 2014). Some of my recent highlighted research achievements include: a pioneering approach to measure optical activity in reflection (Opt. Lett. 40, 4277, 2015), a new formalism for coherence and polarization (Phys. Rev. A, 95,063819, 2017 and Phys. Rev. B, 98, 045410, 2018), and pioneering optical activity measurements on organic thin films (Nature Comm. 9 (1), 2413, 2018) and on nanocomposites (Nature materials 15 (4), 461, 2016). In 2016 I obtained the Paul Drude Award for my research in the fields of polarimetry and ellipsometry. I am the PI of the project EUIN2017-88598 at University of Barcelona devoted to preparing a ERC-CoG proposal (submission in Feb. 2019). During this period I also supervised 1 PhD student working in the theoretical interpretation of polarimetric measurements.

In 2018 I moved to École Polytechnique (France) with a Marie Curie Fellowship (Polarsense, MSCA-IF-EF-ST). This grant is my second awarded Marie Curie Fellowship. I am currently working on a new method for chiral discrimination through optical means, that offers ultrasensitive detection and that has already produced significant research results (4 publications in the last year).
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Resumen del Currículum Vitae:

I have published 79 scientific publications (2 under review) in international leading journals, including high impact journals such as Nature materials, Nature Comm., Nanoscale and Adv. Opt. Mat. My first peer-reviewed scientific publication in an international journal appeared in 2008. A closer look to my list of publications reveals that I am the first author in 39 of my publications the corresponding author in 40 and the single author in 4. I also have 6 publications with the PhD student that I supervised as first author and myself as last author. This clearly proves that I have self-earned my publication record and I am ready to lead an independent research line where I can stablish my own research objectives. My papers have been cited more than 1260 times and my h-number is 21 (according to Google Scholar, January 2019).

My research in the field of light-matter interactions is highly interdisciplinary and it has found applications in several disciplines (optics, nanoscale physics, material science, nanoscale physics, chemistry, etc). This has led to numerous scientific publications journals of different domains and two technological patents: Physics and Optics (e.g., Optics Letters (14), Nature Comm. (1), Phys. Rev. A (1), Phys. Rev. (B), Nanoscale (1) Applied Optics (4), Journal Optical Society of America A (6), , Optics Express (4), etc), Material science (e.g. Nature Materials (1), Adv. Opt. Mat. (1), Journal of Applied Crystallography (1), Applied Surface Science (4),Thin Solid Films (4), Physica Status Solidi A (1), etc) and Chemistry (e. g. Journal of the American Chemical Society (2), ChemPhysChem (2), Chemistry A European Journal (2), Chemical Communications (1), etc).

My work has been recognized by obtaining very competitive fellowships (two different Marie Curie fellowships and a Beatriu de Pinós A

fellowship), which allowed me to independently focus on my own research interests. Overall, I have obtained over 330k from European projects and I have participated in 16 different competitive national and international projects.

I have done 18 invited talks in international conferences or workshops, two of them were plenary talks and another one a tutorial. In 2016 I obtained the Paul Drude Award for my research in the fields of polarimetry and spectroscopic ellipsometry. My recognition in this field is also demonstrated because I am the Vice-Chair of the next International Conference on Spectroscopic Ellipsometry (ICSE8) that will be held in Barcelona (May 2019).

Other curricular achievements that I would like to highlight are the followings. My PhD work received two different awards (Extraordinary Award Prize" by University of Barcelona and the 16th Award of the Council of Doctors of the university). During the period 2013-2018 I have been regularly teaching several courses about Electromagnetism and Optics at Bachelor level of physics degree as "profesor asociado" in Universitat de Barcelona. I have directed one PhD thesis and one Master Thesis and I have been in the examination board of three PhD Thesis in three different countries. Only in the last four years, I have been referee in more than 15 different journals, including Nature Materials, Laser and Photonics Reviews, ACS Photonics, Phys. Rev. Lett., Small, J. Am. Chem. Soc, etc.

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Turno de acceso general

Nombre: GUIJARRO CARRATALA, NESTOR
Referencia: RYC2018-023888-I
Área Temática: **Ciencias y tecnologías de materiales**
Correo Electrónico: nestor.guijarro@gmail.com

Título:

Novel materials for efficient photoelectrochemical energy conversion: from nanoscale engineering to device fabrication

Resumen de la Memoria:

My main research line has focused on the development of new schemes for solar energy conversion, viz. solar cell and artificial photosynthesis technologies, to support the large-scale transition towards renewable energy sources that is foreseen to occur over the next years.
In 2008, following my scholarship award by the University Teaching Training Programme (FPU) to undertake doctoral studies, I joined Gómez s group at the University of Alicante (Spain) to start a project that focused on the development of the emerging quantum dot-sensitized solar cells (QDSSCs) technology. With my studies I gained a rather unique and multidisciplinary expertise encompassing not only the synthesis of semiconductor nanocrystals and QDs but also interfacial engineering, (photo)electrochemical characterization tools and device fabrication. In addition, during this period I was awarded with three mobility scholarships (3-months each) that allowed me to work at renowned laboratories around the world, namely Toyoda s group (University of Electro-Communications, Japan) and twice at Haque s group (Imperial College London, UK) where I further expanded my competences by working with ultrafast pump-probe spectroscopy techniques to analyze the photogenerated charge carrier dynamics in sensitized systems.
In 2013, after being granted with the prestigious Intra-European Marie Curie fellowship I joined Sivula s group at the École Polytechnique Fédérale de Lausanne (EPFL, Switzerland) as a post-doctoral researcher. Complementing my research experience in the field of solar cells, my new research project focused on solar water splitting with the specific aim of developing solution-processable and high-efficiency copper-based chalcogenides for hydrogen production by leveraging semiconductor nanocrystals as the building blocks. More specifically, I pioneered several interfacial engineering treatments that demonstrated to enhance the catalytic response for hydrogen generation as well as processing protocols that afforded to turn catalytically-inactive but easily fabricated nanocrystalline films into benchmark-performance microcrystalline or mesostructured films. In addition, but in the framework of another project, I led an extensive investigation on spinel ferrites as photoanodes for water oxidation, establishing novel synthetic routes, the intrinsic parameters that control the catalytic activity as well as the defect-engineering routes to manipulate them.
In 2016, I was awarded with an Ambizione Energy grant , which allowed me the exciting opportunity to manage and fund my own research team within Sivula s group at EPFL. My independent research project began with the development of a new set of surface-sensitive tools to directly probe the semiconductor-liquid-junction where the photoelectrosynthetic reactions take place but which conventional techniques cannot access. This novel electrochemical platform provided us with unprecedented information on the interfacial energetics and kinetics of the reactions.
I continue leading an independent research team that focuses on the operando characterization of the interfacial reaction characteristics in solar water splitting systems. Overall, I am an internationally recognized expert in the field of solar energy conversion, specifically on the interfacial engineering and solution-based processing of nanostructured materials.
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Resumen del Currículum Vitae:

I earned my Bachelor Degree in Chemistry at the University of Alicante (UA) in 2007 with the highest grades, and as a result I received several awards: the Extraordinary Graduation award from UA, the Regional Graduation award (ranked 1st) and the National Graduation award (ranked 3rd).
In 2013, I obtained a PhD in Materials Science from the University of Alicante with the highest score (Cum Laude) under the supervision of Prof. Gomez and Prof. Lana-Villarreal. As a PhD fellow I was awarded with a scholarship from the Formación de Profesorado Universitario program (FPU) in 2008 as well as three different mobility grants (approx. 3 months each) that allowed me to join Prof. Toyoda s group (University of Electro-Communications, Japan) in 2009, and Prof. Haque s group (Imperial College London, UK) in 2010 and 2011. In 2013, I was awarded a prestigious Intra-European Marie Curie fellowship (185 k) and started independent postdoctoral research at the École Polytechnique Fédérale de Lausanne (EPFL, Switzerland) in Prof. Sivula s group. Later on, in 2016 I was awarded with an Ambizione Energy grant (690 k) to continue my career as a principal investigator with my own research team at EPFL which is still ongoing. All these experiences in various renowned institutions with strong research facilities endowed me with an interdisciplinary background in the field of solar energy conversion as well as with the competences required to attract external funding and independently manage innovative research projects.
My scientific career has resulted, so far, in 36 international peer-reviewed publications. Among them, I am the first author in 17, corresponding in 8 and last author in 1. Likewise, I am the co-author of two book chapters. Overall, I have garnered over 1870 citations and an h-index of 17 (Scopus), with 11 of my publications in high-impact (impact factor > 10) journals. In addition, I am the main corresponding author of 24 contributions to peer-review conferences, including 12 oral talks (3 as invited speaker) and 12 poster presentations. Moreover

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I have participated actively in over 16 national and international projects.
Throughout my career I have supervised and mentored 9 MSc and PhD students, with 1 directed MSc thesis and 1 PhD thesis (ongoing). Likewise, I have worked as lecturer and teaching assistant in several Bachelor and Master courses. Likewise, I presently serve as a referee of high-impact journals such as Nature Communications (NPG), Advanced Materials (Wiley-VCH), Chemistry of Materials (ACS) and Journal of Materials Chemistry A (RSC).
Overall, my research interests focus on the development of new schemes for solar energy conversion, mainly photovoltaic and photoelectrochemical solar water splitting devices. My multidisciplinary research encompasses the development of new synthetic and processing routes, interfacial engineering, fundamental characterization and device fabrication.

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Turno de acceso general

Nombre: MANCA , MICHELE ANDREA
Referencia: RYC2018-024399-I
Área Temática: **Ciencias y tecnologías de materiales**
Correo Electrónico: mmanca@leitat.org

Título:

Advanced Nanomaterials for Solar Energy Technologies

Resumen de la Memoria:

MM accrued more than twelve years research experience in the field of nanostructured materials and electrochemical technologies for solar energy conversion and storage while managing several challenging R&D projects.
He has been coordinating a multifaceted line of strategic research activities aimed at the development of advanced photo-electrochemical devices to be installed into the next generation of glazed building façades and capable of dynamically optimizing their energy performances across a wide range of interior and exterior climatic conditions.
Most relevant technological achievements recently delivered by his research group refer to development of highly efficient nanostructured metal-oxide electrodes with finely controllable nano-architectures, whose peculiar prerogatives have been also advantageously exploited both in electrochromic windows and Li-ion batteries.
He can claim a consolidated knowledge of the following subjects:
- colloidal nanomaterials, as he had the opportunity to collaborate with several established nanochemistry groups and to implement several different classes of shape-tailored metal and semiconductor nanocrystals, to be employed in my energy conversion systems
- nanofabrication techniques, which have been used to realize engineered nanostructured thin films and electrodes for a wide spectrum of applications, ranging from functional protective coatings realized by sol-gel or by electrochemical deposition to mesoporous electrodes on flexible substrates realized by screen-printing or ink-jet printing
- electrochemical characterization techniques, which have been intensively adopted to investigate the inherent structure-to-performance relationships within the above referred research fields: cyclic voltammetry, electrochemical impedance spectroscopy, galvanostatic intermittence titration, Mott-Schottky plot, etc.
MM established a network of scientific collaborations with European leading researchers dealing with nanomaterials and energy conversion technologies and recently submitted some ambitious R&D projects in collaboration with some of them. At this stage of his career MM is strongly motivated to accept new challenges and greatly intrigued by the prospect of expanding his research focus over new applications of the environmentally sustainable photo-electrochemical technologies developed in the past 5 years.
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Resumen del Currículum Vitae:

Michele Manca received his PhD in Nanotechnologies from University of Salento (Lecce, Italy) at July 2009. Upon spending two year as post-doc researcher at the National Nanotechnology Laboratories of CNR (Italy) and 6months as visiting researcher at the Technical University of Helsinki (Finland), in 2011 he started working at the Italian Institute of Technology, where he spent 7 years as team leader, coordinating a multifaceted research line devoted to the development of advanced photo-electrochemical materials & devices for solar energy conversion and storage. In October 2017 he moved to LEITAT, a technological institute recognized by the Catalan Government (TECNIO) and by the Spanish Ministry of Science and Innovation with the mission of collaborating with companies and other entities to create economic, social and sustainable value by R&D projects and technology processes from innovation and creativity . He is nowadays working on the implementation of a novel generation of smart switchable plasmonic windows, capable of blocking the solar heat gain during hot summer days and to allow radiation heating in winter conditions. His scientific interests range from the synthesis and characterization of novel smart nanomaterials to the implementation of energy-efficient solutions for building integration. He is author of 55 articles on international scientific journals (h-index 21) and 4 granted patents. He participated to several national and international research projects (many as work-package leader) and coordinated several R&D initiatives supported/funded by national & international tech companies, as well as ASTRON FIAMM, iGUZZINI ILLUMINAZIONE, TOZZIgreen, COMSA, INTERCOMET, ARIÑO DUGLASS. He is member of the International Electrochemical Society and of the International Society for Optics and Photonics. He attended more than 100 international conferences (recently as Invited Speaker at the International Meeting on Electrochromisms hold in Chiba (Japan) at August 2018). He also organized and chaired the past two editions of the session Dynamic Glazing Technologies at the prestigious Advanced Building Skins conference in Bern (Switzerland).

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Turno de acceso general

Nombre: PEREZ ANTOÑANZAS, ROMAN
Referencia: RYC2018-025977-I
Área Temática: **Ciencias y tecnologías de materiales**
Correo Electrónico: rperezan@uic.es

Título:

Engineering tissue regeneration with novel designed biomaterials

Resumen de la Memoria:

My main research has been centered on the development of novel biomaterials for the regeneration of damaged tissues. Currently the gold standard for tissue regeneration are autograts, allografts or xenografts. Nevertheless, the limited availability, the possible transmission of diseases as well as the pain morbidity urges to seek other viable sources for tissue regeneration. For this purpose, biomaterials have emerged as an alternative source. My research has been devoted to develop novel biomaterials to promote the regeneration of damaged tissues.

I did my PhD under the supervisor of Prof Maria Pau Ginebra (2011) at the Technical University of Catalonia. During my PhD I designed novel calcium phosphate cement formulations for the regeneration of bone by incorporating different types of biomolecules. In parallel, I searched new processing techniques of calcium phosphate cements to obtain different morphologies, such as microspheres that could be used as cell microcarriers. At this time, I became familiar with several physico-chemical analysis techniques in the field of materials science, as well as basic training in the cell culture and molecular biology field. During my PhD, I obtained two short term abroad visiting fellowships to perform research at Harvard University-MIT (9 months) and another research fellowship to perform research at Dankook University (2 months).

After my PhD, my postdoctoral training at Dankook University (2011-2013) allowed me to focus more on understating the biological interactions of cells with biomaterials. At this time, I was interested in developing biomaterials that could perform two main roles: on the one hand to release multiple molecules in a time dependent and controlled manner, and on the other hand to encapsulate cells within the biomaterials. For this purpose, I developed a novel hydrogel based system, termed as core-shell hydrogel, that allowed obtaining fibers composed of two different concentric materials, which allowed either to encapsulate different biologically relevant molecules on each material, or to encapsulate cells within the central material. Furthermore, I became as well interested in understanding how cell fate could be modulated by providing certain chemical and physical cues to the biomaterials. In this sense, I was able to fabricate biomaterials in different morphologies, such as macroporous scaffolds, fibers, microspheres, hydrogels, or even nanoparticles to allow guiding cells in an adequate manner. Furthermore, I was able to combine the different strategies to provide multifunctional-based biomaterials. The highly innovative papers with high impact factors and the elevated number of papers published in short time allowed me to be appointed a tenure track position, becoming the first foreign assistant professor to perform research at Dankook University (2104-2106). I did two other postdocs, one in University College Dublin (2013) and another one in Ryerson University in Canada (2013-2014). At this time, I was interested in understating how to fabricate biomaterials for other applications other than bone and became interested in liver tissue engineering and cartilage tissue engineering.

In 2016 I was granted a Juan de la Cierva fellowship. I am currently the principal investigator and director of a recently formed Bioengineering Institute, supervising 6 PhD students and 2 postdocs

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Resumen del Currículum Vitae:

Education

2006-2011	PhD in Materials Science, Technical University of Catalonia, Spain.
2002-2006	BSc in Chemistry, University of Barcelona, Spain.

Appointments

Current	Researcher, Universitat Internacional de Catalunya, Spain
2016 - 2018	Juan de la Cierva Fellow, Universitat Internacional de Catalunya, Spain
2014 - 2016	Assistant Professor, Dankook University, South Korea
2013 - 2014	Postdoctoral Fellow, Ryerson University, Canada
2013	Postdoctoral Fellow, University College Dublin, Ireland
2011 - 2013	Postdoctoral Fellow, Dankook University, South Korea
2011	Visiting PhD Student at Dankook University, South Korea
2010 2011	Visiting PhD student at Harvard University MIT

Awards and Fellowships

2016	Juan de la Cierva Fellowship
2013	Outstanding PhD award by the Technical University of Catalonia

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2011	European Biomaterials and Tissue Engineering Doctoral Award (2011)
2011	Excellent Cum Laude decision on thesis dissertation
2011	Spanish Ministry of Science and Education short-term abroad fellowship (visiting at Dankook University)
2009	Spanish Ministry of Science and Education short-term abroad fellowship (visiting at Harvard University)
2007-2011	Spanish Ministry of Science and Education Predoctoral fellowship
2006-2007	Bioengineering Institute of Catalonia graduate fellowship
2005-2006	Spanish Ministry of Science and Education undergraduate fellowship at University of Barcelona

Scienetific Production

JCR articles	51
First author articles	23
Corresponding author articles	2
Q1 articles	30
Total citations	1350 (Scopus)
Citations/year (last five years)	337
h-index	21
Book Chapters	2
International Patents	3
On-going thesis supervision	6
Invited lectures	7

Funding as Principal Investigator

2018	Development of sweat detection kit Phase II. Funded by Martiderm (Private company). Amount = 14,800
2017	Development of sweat detection kit. Funded by Martiderm (Private company). Amount = 10,200
2017	Development of Vitamin C releasing hydrogels. Funded by Martiderm (private company). Amount = 10,600
2014-2017	Therapeutic cobalt containing calcium phosphate cements. Funded by National Research Foundation (South Korea). Amount = ~ 154,000 .

Highlighted papers

Perez RA, Shingh RK, Kim TH, Kim HW. Materials Horizons 2017,4, 772-799 (IF = 10.7).

Perez RA, Han CM, Choi SJ, Leong KW, Kim HW. Prog Mater Sci. 2016; 82: 234-293 (IF=31.5)

Olmos J, Perez RA#, El-Fiqi A, Kim JH, Kim HW#. Acta Biomaterialia 2015: 28, 183-92. (IF=6.1) Perez RA, Seo SJ, Won JE, Lee EJ, Jang JH, Knowles JC, Kim HW. Mater Today 2015: 18, 573-89. (IF=21.7)

Perez RA, Kim JH, Kim TH, Kim HW. Acta Biomaterialia 2015: 23, 295-308. (IF=6.1)

Li MG, Hakimi N, Perez RA, Waldman SD, Kozinski J, Hwang D. Advanced Materials 2015: 27, 1880-6. (IF=19.8)

Perez RA, Kim HW. Acta Biomaterialia 2015: 15, 2-19. (IF=6.1)

Perez RA, El-Fiqi A, Park JH, Kim TH, Kim JH, Kim HW. Acta Biomateralia 2014: 10, 520-30. (IF=6.1)

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Turno de acceso general

Nombre: GARCIA ROCHA, VICTORIA
Referencia: RYC2018-024404-I
Área Temática: **Ciencias y tecnologías de materiales**
Correo Electrónico: vgarciarocha@gmail.com

Título:

Engineering lightweight, tough and electro-conductive graphene/ceramic composites for structural applications

Resumen de la Memoria:

My research has been devoted to advance the fields of carbon-based materials, carbon-ceramics composites and ceramic composites. These materials have vast energy and structural applications. A particular area of focus is the study of the relationship between structure and functionality of advanced ceramic composites, which enables the development of new synthesis, scale up and processing technologies and thus the discovery of new composite materials. During my research career I have applied my expertise to diverse research problems in this field, such as the development of new petroleum binders for magnesia-carbon refractories, the sol-gel synthesis, processing and sintering of a wide variety of ceramic nanoparticles and the fabrication of advanced ceramic-carbon composites by spark plasma sintering. More recently I have been working on new, state-of-the-art processing techniques such as freeze casting and 3D printing. These techniques have greatly attracted my interest due to their potential to build composites by means of casting porous scaffolds or by printing which gives us freedom to design any imaginable shape. These techniques also allow us to tailor the properties of the composites and we have proven that the formation of layered ceramics with weak interfaces is a successful route to increased toughness with great potential for scale up. I am also currently working in the field of graphene-ceramic composites, which opens new and exciting pathways in which carbon materials can be used to great advantage due to their lightness and electronic properties. In the next 5 years I would like to focus my research on the development of new composite structures:

1. Lightweight structural composite structures

I plan to use my expertise to design and fabricate porous composite structures using manufacturing techniques which able to provide the required control over the material microstructure as well as the development of efficient sintering strategies to fabricate strong and stable graphene/ceramic structures.

2. Wastewater and environment graphene enhanced semiconductors

My ultimate goal is the development and manufacture of a new family of supported photocatalyst composite materials, based on graphene, which are active under a broad range of the solar radiance due to the added effectiveness under visible light provided by the graphene support. It is my plan to use sol-gel synthesis combined with ceramics processing and sintering techniques to be able to support the designed photocatalysts into composite structures.

3. Routes for large scale production of these composites structures

Up-scaling and understanding the requirements for industrialization is currently one of the major problems in the production of newly developed composite structures, and it is also one of my main interests.

Should I be successful in gaining a Ramon y Cajal position, I would seek to apply jointly within the University of Oviedo and with my academic and industrial collaboration network across the Spain and in the UK, I will explore collaborations with existing contacts at different Russell Group Universities. I also intend to continue my research in the field of carbon materials alongside International collaborators with whom I worked during my period as a Marie Curie Fellow.

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Resumen del Currículum Vitae:

My research has covered mainly the fields of carbon-based materials, ceramics and ceramic composites synthesis, processing, manufacturing and characterization with the aim of developing novel functional composites for structural, energy storage or biomedical applications. I am a Member of the Royal Society of Chemistry, MEng Chemical Engineer with PhD in Materials Science. I was appointed lecturer in Composites in the School of Engineering at Cardiff University in July 2016. Before I was Marie Curie Fellow at Imperial College London, ICL (2014-2016) in the group of Prof. Saiz in the Materials Department. Previously, I worked in the Chemical Engineering Department at Bath University. Before moving to UK I had already been a postdoctoral researcher from 2009 to 2012 in a technological centre ITMA (Technological Institute of Materials) in Spain where I developed excellent links with industrial partners and at the same time a strong knowledge in ceramics synthesis and their consolidation by Spark Plasma Sintering. I successfully completed my PhD in Spain in the National Institute of Coal (CSIC) at the University of Oviedo (2008) under the supervision of Prof. R. Menendez.

I have published 35 peer-reviewed journal articles, 14 as first or second author, in a number of prestigious materials science journals such as ACS Applied Materials and Interfaces, Nature communications or Advanced Materials. My current h-index is 14 and I have 513 citations. I delivered over 30 presentations at the International Materials Research Society Congress, International Congress on Ceramics and the Carbon conferences among others. I have published 3 patents related to carbon materials. My international standing has been recognized through frequent invitations to review articles in prestigious journals such as ACS App. Mat. Interf (I.F 8.097), Sci Rep.(I.F. 4.609) from Nature or to write news letters at MRS Bulleting.

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Turno de acceso general

The most significant scientific achievements of my career to date are

1. Proved how designing water-based thermoresponsive inks to 3D-print different materials (graphene and copper) in one step will enable the fabrication of bespoke energy storage devices with complex geometries. ACS App Mat & Int (2017) 9(42), pp. 37136-37145
2. Revealed bioinspired self-monitoring ceramics using graphene 3D networks. Nature Communications (2017)8,14425
3. Developed novel nanostructured photo catalyst materials using graphene. Journal of Materials Chemistry A (2016)4(19), pp. 7200-7206
4. Scaled up the synthesis of graphene oxide and developed three-dimensional graphene networks which in combination with polymers allowed the fabrication of composites with sensing functionalities. Advanced Materials (2015)27(32), pp. 4788-4794
5. Revealed how using colloidal methods and graphene oxide to achieve excellent dispersion of 2D materials into ceramic matrices is a key step towards the fabrication of functional composites. Journal of the European Ceramic Society (2013) 33(15-16), pp. 3201-3210 (82 citations)
6. Developed colloidal and sol-gel approaches to the synthesis of magnesium aluminate which in turn combined with slip casting and Spark Plasma Sintering manufacturing led to transparent ceramics. Ceramics International (2014)40(3), pp. 4065-4069 The development of synthesis, scale up and processing technologies with the aim of finding new composite materials

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AGENCIA ESTATAL DE INVESTIGACIÓN

AYUDAS RAMÓN Y CAJAL
CONVOCATORIA 2018

Turno de acceso general

Nombre: ORERA UTRILLA, ALODIA
Referencia: RYC2018-025553-I
Área Temática: **Ciencias y tecnologías de materiales**
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Título:

New Functional Materials and Devices for Energy Applications

Resumen de la Memoria:

In the past decades, both the production and storage of energy have become a matter of concern, mainly due to some pessimistic reports about diminishing reserves of fossil fuels. Besides, there has been a remarkable increase in the worldwide interest on the harmful effect of our actions on the environment, what makes necessary a drastic change in the actual energy system. Additionally, technological development brings an increasing demand of new high capacity/safety energy storage systems.

My research has focused on the study of new materials for energy applications, with the main target being the development of functional materials in order to improve the performance of electrochemical devices such as solid oxide fuel cells (SOFCs) or lithium and lead-acid batteries. This goal has been approached in a multidisciplinary way, paying attention to their chemistry, physical properties and processing conditions in real application devices. Regarding the solid oxide fuel cells research line, aiming to go beyond the traditional oxides used in these applications (i.e. fluorite or perovskite type), novel materials have been studied from the point of view of their conduction (electronic, oxide ion, proton) and the correlation between their electrical properties with their crystalline structures (columbite, apatite). In a second step, an optimization of their functional properties and their integration into real devices are carried out in order to fulfil their promise as exciting novel functional materials.

My work in lithium batteries has been focused on the development of new electrolytes for all solid state batteries. These devices bring up many advantages that include higher safety and stability, high energy densities, broad operation temperature and voltage range In this regard, my work has mainly been directed to the study of Li ion conducting materials with the garnet structure, since they are very promising candidates for this application. This study, supported with my supervision of a PhD thesis, comprises both the fundamental aspects of the Lithium distribution and conduction in the structure and the processing of the material for its application in real batteries.

A third research line, with a more immediate application, arises from my participation in a Retos-Colaboración project with the international company Exide Technologies. This project deals with the optimization of the positive electrodes of Lead-acid batteries, mainly by the introduction of nanostructured additives that modify their structure and boost the chemical reactions taking place, with the aim of reducing the energy cost of the charging processes. The optimistic results from the on-going work have already encouraged operation-scale tests with very positive feedback.

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Resumen del Currículum Vitae:

After having started my research by means of 2 research grants (Introducción a la Investigación from CSIC and Beca de Colaboración) at Universidad de Zaragoza, I graduated from that university in 2002 (Industrial Engineer specialized in Materials). I obtained my PhD in Materials Science and Technology (Premio Extraordinario de Doctorado award) from Universidad Carlos III de Madrid in 2007, having carried out part of my research work at Universidad San Pablo CEU and University of St Andrews (United Kingdom) and funded, among others, with a FPI grant from Comunidad Autónoma de Madrid. My first postdoctoral period comprises two postdoctoral contracts at University of Surrey and University of Birmingham (United Kingdom) (2008-2010), where I focused on the study of apatite materials for solid oxide fuel cells within a cooperative project amid 3 universities. This collaboration between research groups allowed an interdisciplinary study, pairing different experimental techniques with calculations based on DFT models. In 2010 I started working at Instituto de Ciencia de Materiales de Aragón, ICMA, where my research has been partially funded by both a JAE-DOC from CSIC (September 2010) and a Juan de la Cierva contract from Ministerio de Economía y Competitividad (December 2012). During this period I continued my research on solid oxide fuel cells (with the actual supervision of a PhD) but also started a new line of work in materials for solid state lithium batteries, including the supervision of 1 PhD student that finished in 2016. During this period at ICMA I have also gained experience in technology transfer to industry, having participated in different technological projects (a materials for fuel cells project funded by Saint Gobain CREE with 332.000 , a Retos Colaboración 577.000 , project with EXIDE Technologies that extends my research in batteries to Lead-acid systems) and authoring a licensed patent on a new material for electrode based on eutectic systems.

As a summary of my interdisciplinary scientific career, I have participated in more than 20 research projects (4 International projects), being the PI of one of them, and various industrially driven research contracts (being PI of one of them), with an international licensed patent as a result. I have published 39 SCI articles (70% as first or second author) in journals of high impact factor and quality (85% in Q1), highlighting papers in Journal of the American Chemical Society (IF = 14.3), Angewandte Chemie (IF = 12.1), Chemistry of Materials (IF = 9.9, including a highly cited review) and Journal of Materials Chemistry (IF=9.9). The citations of these articles entail a h-index of 17 according to Google Scholar. Besides I have presented my work in more than 50 renowned conferences (3 invited) and 4 invited seminars. Together with this research activity, I have lecturing experience and have supervised 10 master and degree thesis as well as 2 PhD

students.

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AYUDAS RAMÓN Y CAJAL
CONVOCATORIA 2018

Turno de acceso general

Nombre: GARBAYO ATIENZA, ELISA
Referencia: RYC2018-025897-I
Área Temática: **Ciencias y tecnologías de materiales**
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Título:

Novel Tissue Repair Strategies Based On Cytokine Slow-Releasing Biomaterials Combined With Adult Stem Cells

Resumen de la Memoria:

I have developed an internationally-focused research career in Spain, USA and France in the field of Pharmaceutical Technology, Drug Delivery Systems and Regenerative Medicine. My research activities have been linked to biomedical materials for regenerative medicine and the translation of these approaches towards the clinic. I obtained a European PhD in Pharmacy from the University of Navarra in 2007 under the supervision of Prof. MJ Blanco-Prieto and Dr. MS Aymerich focusing on the neurorestorative effect of glial cell line derived neurotrophic factor using biodegradable microspheres in animal models of Parkinson s disease (rats and monkeys).
From 2007 to 2010, I carried out my postdoctoral research activity on Tissue Engineering and Stem Cell Therapy in the USA (Prof. P Schiller University of Miami) and in France (Prof. JP Benoit and Prof. C Montero-Menei Inserm U646-University of Angers). As a post-doctoral researcher, I independently developed several projects working on the use of adult stem cells combined with bioactive vectors to repair the central nervous system.
In 2011, I was awarded with a Juan de la Cierva Fellowship on Materials Science and Technology which allowed me to re-join the group Nanomedicines and Drug Delivery lead by Dr. MJ Blanco-Prieto s group (University of Navarra). The project, done in collaboration with Prof. F Prosper (Cell Therapy Area, CUN), developed novel regenerative strategies based on cytokine slow-releasing biomaterials combined with adult stem cells for cardiac repair. Among other projects, I pioneered the development of microparticles as an injectable protein delivery biomaterial for treating myocardial infarction in a clinically relevant model of ischemia-reperfusion in rodents and pigs.
In the last years as senior researcher in the group Nanomedicines and Drug Delivery I am leading several research projects in the field of tissue engineering for heart and brain regeneration based on the use of pluripotent stem cells combined with injectable biomaterials that have tunable properties as growth factor delivering polymeric microspheres or hydrogels reinforced with growth factor loaded micro/nanoparticles. Finally, very recently, our group is evaluating the potential of squalene adenosine nanoparticles for heart ischemia treatment within the framework of the EuroNanoMed project NANOHEART coordinated by Prof. P. Couvreur. My international mobility, scientific production and supervision of students show my leadership and independent capabilities to perform an independent research.
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Resumen del Currículum Vitae:

- 43 peer-reviewed publications (30 Q1 publications, 1 editorial and 8 book chapters) in the field of Regenerative Medicine in top-ranked journals including Biomaterials (2 papers) or Journal of Controlled Release (7 papers)
- 4 publications as corresponding author and 31 as first/second author
- Guest editor of the Special Issue Biomaterials in Tissue Engineering published in the International Journal of Pharmaceutics (2017)
- 2 papers selected as cover in first decile journals: Journal of Controlled Release (2017) and Movement Disorders (2011)
- 1194 citations (H-index 18) with 3 works cited more than 100 times and an average of 180 citations/year the last 5 years
- PI in one national project funded by MINECO (SAF2017-83734-R) and participation in 17 research projects (4 european/international: NANOHEART, LEADERA, INELPY, NPQ10, 9 national, 3 regional and 1 private)
- Juan de la Cierva Fellowship on Materials Science and Technology (2011-2013) in the group of Prof. MJ Blanco-Prieto.
- 67 communications in conferences (2 invited speaker and 23 oral presentations)
- One international patent, collaborations with companies (ROVI, Coretherapix/Tigenix) and several fellowships and awards
- Expert in the Spanish State Research Agency
- Reviewer of 25 journals of Delivery Science and Technology like Advanced Functional Materials, Small, Biomaterials or Acta Biomaterialia (more than 70 Q1 reviews performed)
- 2 six-year research periods recognized by CNEAI
- Actively involved in the formation of young scientists. Supervised 29 students (1 European PhD + 1 PhD on-going, 4 Master s and 23 bachelor s students at the University of Angers, Modena and Navarra)
- Teaching activities in the area of Pharmaceutical Technology at the School of Pharmacy and Nutrition of the University of Navarra
- Accredited as Profesor Ayudante, Profesor Contratado and Profesor de Universidad Privada by ANECA in 2011

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AGENCIA ESTATAL DE INVESTIGACIÓN

AYUDAS RAMÓN Y CAJAL
CONVOCATORIA 2018

Turno de acceso general

Nombre: MOLINA SANCHEZ, ALEJANDRO
Referencia: RYC2018-024024-I
Área Temática: **Ciencias y tecnologías de materiales**
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Título:

Ab initio calculations of the optical and magnetic properties of 2D materials

Resumen de la Memoria:

I am a theoretical physicists working in the interface of materials science, condensed-matter physics and chemistry. My research line focuses on optical, electronic, dynamical and magnetic properties of nanostructured materials, with focus on 2D materials like graphene and transition metal dichalcogenides. I work in the development of theory and ab initio methods to calculate excitonic states, electron-phonon physics, phonons and Raman spectroscopy, ultrafast carrier dynamics, physics of the spin-orbit interaction and spin dynamics, and phonon-assisted absorption. I am developer of scientific software applied to materials science (Yambo, Yambopy). The aim is improving ab initio methods, conceiving novel algorithms and using high-performance computing to investigate complex and realistic materials and to boost the discovery of novel materials.

2006-10. PhD in Physics at the University of Valencia. I develop my own scientific code to investigate the impact of quantum confinement on the optical properties of nitride-based quantum wires. I completed my PhD training with a research stay of 4 months at the Max-Planck Institute of Solid-State Research in Stuttgart (Germany).

2011-12. Postdoc at the Institute of Electronics, Microelectronics and Nanotechnology of Lille (France) supervised by Ludger Wirtz: I investigated phonons and Raman spectroscopy in 2D materials with focus on the interaction of 2D materials with metallic and semiconducting substrates.

2012-14. Postdoc at the University of Luxembourg (Prof. Ludger Wirtz): I increase my expertise with theory of excitonic properties in 2D materials, the physics of the spin-orbit coupling and the electron-phonon interaction. I joined the team of developers of the Yambo code to develop ab initio methods applied to materials science.

2014-17. Principal Investigator at the University of Luxembourg: I started the research line of ab initio modeling of carrier dynamics and ultrafast spectroscopy of 2D materials. I obtained funding as independent investigator from the Luxembourg National Research Fund. I investigated on the relaxation of photo-generated excitations via electron-phonon and electron-electron scattering, and radiative recombination. I described the spin and valley dynamics of single-layer transition metal dichalcogenides. I completed a research stay of one month in the group of Andrea Marini (CNR-Roma). I also carried out research of ab initio Raman spectroscopy, co-supervising one PhD and two master students.

2017-19. Juan de la Cierva-Incorporación at the Institute of Materials Science of the University of Valencia (ICMUV). I bring my expertise in ab initio methods applied to materials science to start a research line in simulation of materials properties, to develop methods and new concepts in solid-state. In collaboration with the experimentalists of ICMUV I have worked in excitonic states in organic and inorganic 2D perovskites, novel ferromagnetic 2D materials, heterostructures of 2D materials for efficient charge transfer, and high-throughput screening of 2D materials with novel quantum properties. I have brought to the ICMUV my international collaborations (theoretical and experimental), my expertise in ab initio methods and software development. I am also involved in the teaching of the Applied Physics Department.
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Resumen del Currículum Vitae:

I am researcher at the Institute of Materials Science of the University of Valencia with a Juan de la Cierva-Incorporación contract. I am responsible of theory and simulations in the Unit of Materials for Optics and Devices (UMDO).

Publications
I have published 26 papers (plus 4 submitted) and 1 invited review (plus 1 invited review in process in the new IOP journal Electronic Structure) in international peer-reviewed journals of high impact factor such as Nano Letters (x5), Physical Review B (x11), and 2D Materials (x1), among others. I am the corresponding author of 12 articles, and around half of my publications have been done in collaboration with experimental colleagues. The indicators of quality of my publications are according to Google Scholar: h-index 15, i10 index 15, mor than 1520 citations. I have relevant publications regarding optical and electronic properties of 2D materials. Two of my articles have more than 250 citations.

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Turno de acceso general

International experience, I have worked in international and recognized research centers for more than 6 years. From 2011-2012 I was postdoc in the Institute of Electronics, Microelectronics and Nanotechnology (IEMN-CNRS) in Lille, France. In the period 2012-2014 I joined the University of Luxembourg as a post-doc and from 2014-2017 I was the Principal Investigator of the research line focused on theoretical spectroscopy in graphene and other 2D materials. I have participated in 6 European projects; I am developer of the Yambo Scientific software and member of the European Network ETSF.

Funding
I have been the PI of a research project Modelling of carrier dynamics and ultra-fast spectroscopy in 2D materials CORE program, Fonds National de la Recherche Luxembourg). In addition I have collaborated in 6 European research projects. I have established an international network with colleagues from: Politecnico Milano (G. Cerullo h-81), CNR-Rome (A. Marini h-31), U. Luxembourg (L. Wirtz h-38), European Synchroton Radiation Facility (J. Segura-Ruiz), INSP Paris (M. Calandra, h-41), U. Hamburg (G. Bester h-37). I am recipient of the competitive grant Juan de la Cierva-Incorporación .

Conferences and Workshops
I have 6 invited talks in international conferences (APS March Meeting 2019, DPG 2018, GEFES 2018) and workshops. I have presented more than 15 contributed talks in international conferences such as the APS March meeting, the DPG meeting, MRS, E-MRS, ETSF and CECAM workshops. In 2017 I have been co-organizer of the school Advanced computing of excited state properties in solids and nanostructures with Yambo at the EPFL-CECAM, Lausanne.

Regarding other merits, I have supervised 1 PhD thesis and 2 Master students. I have teaching experience in the Universities of Luxembourg and Valencia in subjects like Quantum Mechanics, Classical Electrodynamics, Complex Analysis and Physics for Engineering. I also participate in dissemination activities (Researcher s day, Luxembourg; Expociencia, U. Valencia). I have been presenter in the Curso Extraordinario of the University of Zaragoza (2018). I am developer of scientific software (ab initio code Yambo). I am frequent reviewer of journals like Nature Comm., Phys. Rev. Lett, Phys. Rev. X, Phys. Rev. Mat., 2D Materials, and Scientific Reports. I am evaluator of the Agencia Estatal de Investigación and of DAAD. I have one sexenio evaluated as excellent.