



AYUDAS RAMÓN Y CAJAL CONVOCATORIA 2015

Turno de acceso general

Nombre: NEDIALKOVA , DANNY
Referencia: RYC-2015-18129
Área Científica: Biología Fundamental y de Sistemas
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Título:

Translational control of protein homeostasis

Resumen de la Memoria:

My scientific career has been driven by my fascination with fundamental RNA-based molecular processes that echo the RNA beginnings of life. This interest arose early in my career, upon my encounter with RNA viruses in a research internship. During my doctoral work with Prof. Eric Snijder at the Leiden University Medical Center (The Netherlands), I explored the regulation of the replicative cycle of nidoviruses ♦ a group of messenger-sense RNA viruses that includes the recently emerged human pathogens SARS-CoV and MERS-CoV. By designing and implementing novel biochemical and genetic tools, I discovered new enzymatic and regulatory activities of two proteins ♦ nsp1 and nsp11, in the nidovirus prototype EAV (Nedialkova et al., PLoS Pathog 2010; Nedialkova et al., J Virol 2009; Tijms*, Nedialkova*, Dobbe* et al., J Virol 2007). My doctoral work revealed how key steps in the nidovirus replicative cycle are orchestrated, aiding the development of antiviral therapies against nidovirus diseases.

After defending my PhD cum laude (highest honors) in 2010, I decided to broaden my scientific training and I shifted my research focus from viruses to cells. I joined Dr. Sebastian Leidel at the Max Planck Institute for Molecular Biomedicine (Germany) with a prestigious EMBO Long-Term Postdoctoral Fellowship to study translation regulation by tRNAs. These small molecules carry an extraordinarily diverse set of chemical modifications at many individual nucleotides. To define how tRNA modifications maximize cellular fitness in different organisms and environments, I develop and exploit a wide range of biochemical, genetic, and large-scale quantitative approaches. I explore translation dynamics in vivo using ribosome profiling, which comprises deep sequencing of ~30 nt mRNA fragments protected from nuclease digestion by bound ribosomes. After establishing the experimental and computational workflows for ribosome profiling in diverse eukaryotes, I discovered that tRNA modifications maintain optimal codon translation rates to promote protein folding in yeast and nematodes (Nedialkova and Leidel, Cell 2015). In a recent collaboration I initiated with the laboratory of Dr. Laurent Nguyen at GIGA (Belgium), we showed that protein misfolding induced by tRNA modification loss severely impairs mammalian brain development (Laguesse*, Creppe*, Nedialkova et al., Dev Cell 2015).

My postdoctoral work provided the first experimental evidence that codon translation speed promotes protein structure acquisition in vivo. Motivated by this discovery, I have developed an independent research program that aims to define how cells exploit heterogeneous translation speeds to instruct protein folding. I plan to combine new technologies for measuring translation speed in vivo with state-of-the-art proteomics to systematically analyze the folding of cellular and viral proteins as they are synthesized in their native environment. I will also investigate how translation speed constrains RNA virus evolution, and how different tissues cope with proteotoxic stress triggered by translation defects. The knowledge gained from this project will offer fundamental explanations for how two central cellular processes ♦ translation and protein folding ♦ are coupled to ensure proteome integrity and prevent protein misfolding, which is a hallmark of aging and diverse human diseases.

Resumen del Currículum Vitae:

EDUCATION

06/2010: PhD in Molecular Biology (cum laude), Leiden University, The Netherlands

07/2004: BSc in Biotechnology (cum laude), European First Level Degree "Job Creation Oriented Biotechnology", Università degli Studi di Perugia, Italy

RESEARCH EXPERIENCE

2010 - present: Postdoctoral researcher (EMBO fellow) with Dr. Sebastian A. Leidel; Max Planck Institute for Molecular Biomedicine, Muenster, Germany

2004 - 2010: PhD student with Prof. Eric J. Snijder and Prof. A.E. Gorbalenya; Leiden University Medical Center, The Netherlands

INDEPENDENT FUNDING

2011: EMBO Long-Term Postdoctoral fellowship (funding of own salary for 2 years)

AWARDS AND HONORS



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2015 Poster Prize, EMBO Workshop "Regulation of aging and proteostasis" (Israel)
2014 Selected in a global competition as a Young Scientist participant in the 64th Lindau Nobel Laureate Meeting (Germany)
2014 Poster Prize, 65th Mosbacher Kolloquium of the GBM (Germany)
2010 PhD cum laude (highest honors)
2006 Travel Award by the American Society for Virology

SELECTED PUBLICATIONS

Laguesse S.*, Creppe C.*, Nedialkova D.D. et al., "A dynamic unfolded protein response contributes to the control of cortical neurogenesis", *Dev Cell* 2015, 35(5): 553-67. *equal contribution

Nedialkova D.D. and Leidel S.A. "Optimization of codon translation rates via tRNA modifications maintains proteome integrity", *Cell* 2015, 161(7): 1606-1618

Nedialkova D.D., Gorbalenya A.E., Snijder E.J. "Arterivirus nsp1 modulates the accumulation of minus-strand templates to control the relative abundance of viral mRNAs". *PLoS Pathog.* 2010, 6(2): e1000772.

Nedialkova D.D. et al., "Biochemical characterization of arterivirus nonstructural protein 11 reveals the nidovirus-wide conservation of a replicative endoribonuclease". *J Virol.* 2009 83 (11): 5671-5682. Issue Spotlight.

Tijms M.A.*, Nedialkova D.D.*, Zevenhoven-Dobbe J.C.* et al., "Arterivirus subgenomic mRNA synthesis and virion biogenesis depend on the multifunctional nsp1 autoprotease". *J Virol.* 2007, 81 (19): 10496-505. *equal contribution

Posthuma C.C., Nedialkova D.D. et al., "Site-directed mutagenesis of the nidovirus replicative endoribonuclease NendoU exerts pleiotropic effects on the arterivirus life cycle". *J Virol.* 2006, 80 (4): 1653-61.

INVITED SEMINARS

02/2016 Max Planck Research Group Leader Selection Symposium; Max Planck Society; Berlin, Germany

02/2016 Group Leader Selection Symposium; Institut Pasteur; Paris, France

02/2016 Group Leader Candidate Symposium; MRC Laboratory for Molecular Biology; Cambridge, UK

11/2015 Cells-in-Motion Brown-Bag Lunch, Muenster, Germany

11/2015: IRB Barcelona, Spain

04/2010: ETH Zurich, Switzerland

01/2010: MHH Hannover, Germany

02/2008: AMC Amsterdam, The Netherlands

CONFERENCE TALKS SELECTED FROM ABSTRACTS

10/2015 14th CRG Symposium; Spain

09/2015 EMBO Conference "Protein Synthesis and Translational Control"; Germany

10/2014 RNA Biochemistry Meeting; Germany

12/2013 Barcelona Biomed Conference "Gene Translation: Fidelity and Quality Control"; Spain

07/2009 28th Annual Meeting of the American Society for Virology; Canada

03/2009 Dutch Annual Virology Symposium; The Netherlands

06/2008 XIth International Symposium on Nidoviruses; UK

07/2006 25th Annual Meeting of the American Society for Virology; USA

MENTORING EXPERIENCE

- Planned and supervised four BSc and MSc internships of 3 - 6 months



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Nombre: RUBIO MARCOS, FERNANDO
Referencia: RYC-2015-18626
Área Científica: Ciencia y Tecnología de Materiales
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Título:

Ceramic Materials: From Basic Concepts to Applications

Resumen de la Memoria:

The main research lines proposed focuses in the investigation of lead-free piezoceramics and micro-nanomaterials; it encompasses the synthesis, structure and properties of lead-free piezoceramics materials and the design and construction of new nanomaterials with novel and useful applications.

I have built up core expertise in a wide variety of different subjects, especially on the compositional design of new lead free piezoelectric ceramics. A relevant result consisted in that the polymorphic phase boundary (PPB) temperature can be modulated by chemical modifications, such as the variation of the A/B ratios of the ABO₃ perovskite structure. We also found that the best piezoelectric properties are obtained for the tetragonal symmetry, and second, there is a linear correlation between the tetragonal distortion, c/a ratio, and the piezoelectric properties. Moreover, in this research line, special emphasis was placed on the compositions-induced phase boundaries by analysing the chemical modifications in detail, and dopant engineering. A remarkable result consisted in that two different behaviors were observed independently of the doping metal: at low concentrations, the tetragonal structure is preserved, while at a high doping level, the material becomes orthorhombic. For any given doping level, a linear dependence was found between the pseudo-tetragonal lattice distortion and the ionic radii of doping ions. Thus, the functional properties of these piezoceramics can be easily controlled through metal oxide doping.

My research career has been characterized by a strong international cooperation (IC) in order to develop joint strategies and technologies in several research areas. This fact has led me to generate a significant number of articles published in high impact journal (34 papers in IC; representing more than 50 % of my scientific production).

A relevant aspect of my scientific career has been trying to transfer basic knowledge to companies or organizations. In this context, a stimulant achievement has been the generation of 4 patents, in particular one based on the dry-nanodispersion method. This innovative approach has led to found a SpinOff Company named ADVANCED DISPERSED PARTICLES S.L. based on our patented dry nanodispersion technology.

It is worth noting that I have been able to get economic allocation provided by a private entity project (NanoBioMatters, S.L.), obtaining individual grants for more than 85.000 €. This project concerns the synthesis, and the design of new BactiBlock® additives based on ZnO with a high efficient antimicrobial and antifungal activity. This issue is currently being addressed on doctoral thesis project of Eva de Lucas Gil, which I co-supervise.

Currently, my research line is focused on the demonstration of how basic or fundamental concepts in ferroelectric materials -particularly in its domain structure as well as domain-wall phenomena- can be utilized in new types of devices. We have shown the surprising ability to move ferroelectric domain walls of a BaTiO₃ single crystal by varying the polarization angle of a coherent light source, making domain walls potential candidates for active device elements in future nanoelectronics.

To conclude, all these relevant achievements aim to achieve improved understanding of basic concepts, which are crucial for further development of novel and useful applications

Resumen del Currículum Vitae:

The research career of Fernando Rubio-Marcos is strongly multidisciplinary and covers the whole spectrum of the investigation of functional lead-free piezoceramics and micro-nanomaterials, dealing with their electric, piezoelectricity, and catalytic properties; it includes key synthetic processing advances, development of high-sensitive techniques, and the design and modelling of the systems. His work encompasses the synthesis, structure and properties of lead-free piezoceramics materials and the design and construction of new nanomaterials with novel and useful catalytic applications.

This factual multidisciplinary approach has led to the publication of over 67* papers in chemistry, physics and materials science. Several of the these contributions have been groundbreaking, and have establishing our present understanding of the chemistry and physics of the lead-free ferro-piezoceramics, and have opening new questions and clues in the field of the piezoelectric materials, establishing it as a key area of research in ferroelectric materials. The quality of these contributions is evidenced by the fact the papers have received more than 876* citations in 6 years, for a corrected h-index of 17*, averaging 153 citations per years (in the last 5 years). The research activity has also been awarded several prizes and distinctions, including the 9 Top 25 Hottest Articles in international journals, a Top Cited Article 2007 to 2011 in Journal of the European Ceramics Society, the WITec Paper Award in bronze, and the 2nd Place Best Oral Presentation at the Workshop 3D Raman Imaging ♦AFM. He has participated in more than 97 presentations in national and international congresses, 30 of them were national congresses, the others 66 were in international congresses, and 9 of them were invited conferences. From the point view of the scientific training, he has finished the international scientific training of 3 Mr.Sc (e.g. ERASMUS- program. Key Action 1 ♦



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Mobility for learners and staff (Higher Education Student and Staff Mobility). Currently, he is centered in the scientific/technological training of 1 Ph.D.

This stimulant and multidisciplinary research has served to generate 1 Spanish Patent, 2 European Patents and 1 international Patent, which at this moment are under company exploitation. So, the Technology Transfer Projects and the private companies Projects carried out by Fernando Rubio Marcos have given important industrial developments, obtaining individual grants for more than 85.000



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Nombre: ZUBIAGA MENDIALDUA, ARKAITZ
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Área Científica: Ciencias de la Computación y Tecnología Informática
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Título:

Mining News and Events from Social Media

Resumen de la Memoria:

Arkaitz Zubiaga's research has primarily focussed on the analysis and mining of social media. He started researching the usefulness of user-generated content associated with web links as a powerful source of information to enhance the metadata available for those web resources. In his PhD thesis he found that, for resources available on the Web ranging from web pages to book catalogs, the descriptions and keywords contributed by users in social media can be of substantial help to boost the performance of an automated classification system that needs to classify web resources into categories, instead of using only the content of the web pages or the books themselves. His PhD research took advantage of social tags shared by users in social bookmarking systems, an early form of social media that became popular in the 2000s, which enabled him to enhance the content available to characterise web resources. His PhD thesis was awarded with the Best PhD award (◆Premio Extraordinario de Doctorado◆).

While still working on the intersection of social media and text mining, Arkaitz broadened the scope of his research during his post-doctoral career to also focus on the analysis and mining of news from social media. Arkaitz's research has ever since focussed on the research and development of tools and techniques to enhance information access on social media, not only to make it easier for average social media users to find relevant information, but also to pave the way of practitioners such as journalists and humanitarian aid workers in their work of sifting through social media for curation. This is how Arkaitz, while at the City University of New York, enlisted the help of a number of journalists to discuss the difficulties they stumbled upon while gathering news from social media, and has since then worked closely together with journalists to make the most of social media for their purposes. He has been involved in research projects with different objectives, including verification of social media content, analysis of trending topics, study of audiences and news readership, and linguistic analysis of social media. He has therefore completed a PhD studentship he did in Spain and Austria, with an international post-doctoral career in the United States, the United Kingdom, and Ireland, while also keeping collaborations open with researchers in Spain.

This research has been conducted while also engaging with the community of researchers in related fields such as computational social science, human-computer interaction, and natural language processing. During this time, Arkaitz has been involved in the organisation of 6 workshops at scientific conferences, has served as a workshop chair at a CORE A conference, and as program co-chair at another conference. He has also served as a PC member at a number of top tier conferences and journals.

Having acquired experience in Computational Journalism, Human-Computer Interaction, and Text Mining for social media, Arkaitz is keen on furthering research on computational techniques to make the most of social media content. This can enable information seeking and tracking during breaking news and emergency situations to be made efficiently, making sure that information is properly curated and that it is as accurate as possible, getting rid of the misinformation that can have harmful consequences in society.

Resumen del Currículum Vitae:

Arkaitz Zubiaga obtained his PhD in Computer Science (with honors) in 2011 at UNED in Madrid, Spain, thanks to a 4-year research fellowship granted by the Community of Madrid. During this period, he also visited the Graz University of Technology for a 3-month stay. He successfully defended his PhD on July 12, 2011, earning a European PhD degree (later recognised as an International PhD degree), and the university selected his dissertation to be given the Best PhD award ("Premio Extraordinario de Doctorado") in 2012. During his PhD studentship, he also received scholarships to attend conferences including DocEng 2009 (granted by ACM) and Wikimania (granted by the Wikimedia Foundation), as well as the 2009 Summer School on Multilingual Information Access (granted by TrebleCLEF).

During his postdoctoral career, he has broadened his skills through research fellowships at the City University of New York in the United States (2012-2013), the Dublin Institute of Technology in Ireland (2013-2014), and the University of Warwick in the United Kingdom (2014-). He has been involved in American, Irish and British research projects at the national level, an industry-funded project in the United Kingdom (funded by the BBC), as well as an EC-funded project at the European level. He has had different roles during his post-doctoral career, ranging from conducting research, writing research papers and assisting PhD students with their work, to leading the performance of research of a European project's subteam, writing project deliverables, and contributing to the writing of research grant proposals more recently. He has collaborated with researchers at leading worldwide universities such as Columbia University, University of Southern California and the University of Oxford.

So far, he has published his work in 9 journal papers, 3 book chapters, and 18 peer-reviewed conferences and workshops, most of which he



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has attended for presenting the work. He has been and is actively engaged with the social media research community, coordinating conferences and workshops, reviewing submissions to top tier journals and conferences, and presenting papers at conferences. He was been a workshop chair at ACM Hypertext 2012, and also served as program co-chair at SocialCom 2014. He has also co-organised six workshops co-located with scientific conferences, including the workshop on Real-Time Analysis and Mining of Social Streams at ICWSM 2012 and WWW 2013, and the Social Media in the Newsroom Workshop, forthcoming at ICWSM 2016. He has also served as a programme committee member at a number of top tier conferences and journals, including Scientometrics (ISI-indexed, Q1), PLOS ONE (ISI-indexed, Q1), JASIST (ISI-indexed, Q1), ACM CHI (CORE A+), ACM CSCW (CORE A), ACM IUI (CORE A), and EMNLP (CORE A). He has also been part of a thesis evaluation committee, in May 2015 at the University of the Basque Country.

As of January 2016 (Google Scholar), he has more than 380 citations with an increasing trend over the last 3 years (65, 84 and 134) and an average of 69 citations in the last 5 years, with an H-index of 10.

His research has also had impact in the news recently, through the 5live Hit List of weekly Top 40 trending topics that is produced for the BBC's Radio 5, and is updated on a weekly basis through the show's website: <http://www.bbc.co.uk/programmes/b04p59vr>



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Nombre: MACULAN , ELENA
Referencia: RYC-2015-18552
Área Científica: Derecho
Correo Electrónico: elena_maculan@yahoo.it

Título:

Derecho penal internacional y comparado en relación con la Justicia de transición y postconflicto

Resumen de la Memoria:

La línea de investigación principal de la solicitante, desde que empezó su trayectoria académica en 2009, siempre ha sido el Derecho penal internacional y comparado en relación con la Justicia de transición y postconflicto. Dentro de esta línea, la investigadora se ha centrado principalmente en los siguientes temas específicos: la interpretación de los crímenes internacionales en los ordenamientos nacionales, con especial referencia a los países latinoamericanos; el mecanismo de los juicios por la verdad argentinos; el diálogo judicial como modalidad de creación del Derecho penal internacional y la fertilización cruzada jurisprudencial; los modelos de intervención delictiva en DPI; la Justicia de transición y postconflicto y el papel del Derecho penal internacional; el proceso de paz en Colombia; el Derecho penal y los fines de la pena en contextos de Justicia transicional. Sobre cada uno de estos temas la investigadora ha publicado varios artículos en revistas, nacionales e internacionales, indexadas y de prestigio en el área de Derecho penal o del Derecho penal internacional, así como una monografía y varios capítulos de libro, en distintos idiomas (español, inglés e italiano). También ha dirigido (o co-dirigido) la edición de tres libros y ha dictado numerosas conferencias y ponencias invitadas en Universidades españolas y extranjeras (Universidad de Trento, Universidad del Norte en Colombia, Universidad de Verona), relacionadas con sus temas de investigación.

Ha participado en dos Proyectos de I+D+i financiados por el Ministerio de Economía y Competitividad (uno de ellos todavía en curso), a los que ha contribuido aportando diferentes resultados de investigación y realizando actividades de gestión y coordinación. Asimismo, ha realizado estancias de investigación en la Universidad de Buenos Aires (Argentina), la Universidad de Trento (Italia), la Universidad de Göttingen (Alemania) y la Middlesex University (Reino Unido) y ha participado en sendos cursos de especialización en Derecho penal internacional organizados por institutos y centros internacionales.

El Derecho penal internacional en relación con la Justicia de transición constituye también el objeto principal de su actividad docente, que desarrolla de manera estable desde hace unos años en los programas de máster, doctorado, licenciatura y formación permanente de posgrado tanto del Instituto Universitario Gutiérrez Mellado (UNED), como de la Facultad de Derecho y de la School of International Studies de la Universidad de Trento.

En 2015 ha sido acreditada para la figura de Profesora Contratada Doctora por la ANECA.

Resumen del Currículum Vitae:

Tengo un Doctorado en Studi Giuridici Comparati ed Europei - Indirizzo specialistico in Diritto e procedura penale e Filosofia del diritto, por la Universidad de Trento y el

título de Doctor Europeo. He obtenido el Premio como Mejor Doctor de la Universidad de Trento del año 2011/2012.

Mis áreas de especialización son el Derecho penal internacional, la Justicia de transición y postconflicto y el Derecho penal comparado.

He publicado numerosos artículos en italiano, español e inglés, en revistas nacionales e internacionales indexadas, tales como el Leiden Journal of International Law, el Nordic Journal

of International Law, la Utrecht Law Review, Indice penale, la Revista Electrónica de Ciencia Penal y Criminología y la Revista de Derecho Penal y Criminología. También he publicado una monografía con una prestigiosa editorial argentina (Hammurabi), de la que es coautor el Prof. Daniel Pastor de la UBA. Asimismo, he escrito numerosos capítulos

de libro en obras colectivas publicadas por reconocidas editoriales españolas y extranjeras, he dirigido o co-dirigido la edición de tres obras colectivas y realizado algunas traducciones y reseñas de libros publicadas en revistas reconocidas.

He dictado numerosas conferencias y ponencias invitadas en Universidades españolas (UNED, Universidad Autónoma de Madrid, Universidad Carlos III) y extranjeras (Universidad de Trento, Universidad del Norte en Colombia, Universidad de Verona) y he participado en dos Proyectos de I+D+i financiados por el Ministerio de Economía y Competitividad, gestionados por el Instituto Universitario Gutiérrez Mellado (IUGM) y dirigidos por la Prof.^a Alicia Gil (uno de ellos todavía en curso) y en un Proyecto de investigación (PRIN) financiado por el Ministerio de Educación italiano y gestionado por la Universidad de Firenze.

He realizado estancias de investigación en la Universidad de Buenos Aires (Argentina), en la Universidad de Trento (Italia), en la Universidad de Göttingen (Alemania) y en la Middlesex University (Reino Unido), ésta última financiada por el Programa José Castillejo del Ministerio de Educación, y he participado en sendos cursos de especialización en Derecho penal internacional organizados por institutos y centros internacionales.



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Tengo experiencia en la organización y dirección de congresos, seminarios y jornadas, soy miembro del Comité de Redacción de la Revista "Diritto penale XXI secolo" y he sido revisora externa por invitación del Leiden Journal of International Law.

Desde 2010 llevo a cabo actividad docente en idioma español, italiano e inglés, en cursos de licenciatura, máster y doctorado, principalmente en el IUGM (UNED) y en la Facultad de Derecho y en la School of International Studies de la Universidad de Trento (Italia), donde he impartido e imparto cursos de Derecho penal internacional y Justicia de transición y dirijo trabajos de investigación y tesis doctorales.

Conseguí la habilitación al ejercicio de la profesión de abogada en Italia en septiembre de 2011.

Desde marzo 2014 tengo un contrato como investigadora postdoctoral Juan de la Cierva, financiado por el Ministerio de Economía y Competitividad, en el IUGM (UNED) de Madrid.

Estoy acreditada a Profesora Contratada Doctora por la ANECA.



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Área Científica: Física y Ciencias del Espacio
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Título:

Artificial acoustic and mechanical media for advanced wave control

Resumen de la Memoria:

My research career comprise 3 years PhD, three years of Postdoc and 3 years of assistant professor:

(2007-2009)

My PhD thesis (supervisor Prof. F. J. Garcia-Vidal) launched the research line on perforated acoustic metamaterials at Universidad Autonoma de Madrid. I focused both on the numerical realization of extraordinary acoustic transmission through small holes and the theoretical blueprints of the first acoustic superlens. During this period my work gave rise to 7 publications (among them, 2 Nature Physics and 1 Physical Review Letters), and I took part as a speaker in several international conferences. Most notably, I was invited as the plenary speaker at the Annual International Conference: Days on Diffraction in St. Petersburg, 2010 before defending my thesis, which was awarded the highest honor, Sobresaliente Cum Laude. As the only acoustician in the group among opticians, I quickly learned how to become an independent figure.

(2010-2012)

In recognition of my outstanding PhD and my exceptional potential as a young postdoctoral researcher, I was awarded (as a PI in all of them) with two prestigious grants offered by the Danish National Research Council and two distinguished grants from the Carlsberg Foundation for my entire postdoctoral stay at the Instituto de Optica, CSIC, in the group of Prof. F. J. Garcia de Abajo. I was the main responsible actor in the construction of a rigorous numerical model to describe the complex scattering properties of perforated multi-layers that enable refraction of sound waves with a negative angle as compared to the normal sense. Also, I developed numerical techniques based on Boundary Element Methods (BEM) to study the excitation of optical surface resonances, surface plasmons, in nano-structures such as graphene ribbon-waveguides. We realized that graphene held many advantages as opposed to noble metals for guiding and confining light and our contribution is today one the highest cited paper in graphene plasmonics. During this period, I published 7 papers (among them, 1 Physical Review Letters and 1 ACS Nano). Also, I presented 3 keynote lectures, 2 as the speaker (invitee) and 1 as co-presenter.

(2013-present)

I was awarded a Sapere Aude grant, which is only given to the most talented candidates among the recipients of an individual postdoctoral grant from the Danish Research Council. With this grant, I was hired as an assistant professor at the Technical University of Denmark (DTU). Here, I initiated my independent phase and lead the research profile of acoustic metamaterials at DTU. Ever since, I published 14 articles (among them, 1 Physical Review Letters, 1 Nature Reviews Materials, and 2 Physical Reviews B Rapid Comm.) and presented a plenary lecture at an international conference in China. I continued my research into exotic acoustic wave properties and published influential papers on extraordinary absorption, negative refraction in hyperbolic structures and piezoelectric gain media. I also introduced mechanical control into graphene plasmonic nano-structures. Given my track record I applied for an ERC starting grant, which aims to support up-and-coming research leaders who are about to establish a proper research team and to start conducting independent research in Europe. After being invited to present my project I got rejected (Score B) but resubmitted after conducting improvements.

Resumen del Currículum Vitae:

I am young and internationally recognized leading researcher in the field of phononic structures and acoustic metamaterials. I obtained my PhD at the Universidad Autonoma de Madrid in 2010, and have been a postdoctoral candidate, supported by a Danish national grant and two grants from the Carlsberg group, at the Instituto de Optica, CSIC in Madrid.

I returned to Denmark in 2013 after receiving an elite researcher prize from the Minister of education and science in order to consolidate my line of research on acoustics in artificial media at the Technical University of Denmark. I have made it to the 2nd round (Score B) of the ERC Starting Grant, which is the most prestigious grant for scientific projects of young candidates. My proposal has recently been resubmitted.

According to Google scholar I obtained more that 950 citations (h-index 11) and have published 3 articles in Physical Review Letters (2 as first author and 1 as second author) and a total of 6 publications within the Nature Publishing Group (2 Nature Physics, 1 Nature Reviews Materials, and 3 Nature Scientific Reports). The impact of my work speaks for itself through highly cited publications in the most



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prestigious journals of physics. In 90% of my journal publications I am either the first or the last author and in 70% of these papers I am the corresponding author, which is a clear indication of my scientific maturity. Many of my results have led to important advancements to the field that is reflected through plenary (2), keynote (3) and invited (14) contributions in the most important international conferences within this field. My scientific results have been mentioned very often in the popular press such as El País, El periodico de Aragon, ABC.es, Science Daily, and ingenjøren.

I am committed to many international conferences as an organizer, member of the program committee, scientific advisory board and session chair. Besides my involvement in many international projects I have been awarded grants as a principle investigator that in total amounted up to approximately 600.000 Euros.

My independent and leading character is demonstrated through multiple publications as the only young theoretical investigator co-authoring research articles and review articles with international leading experimentalist: Prof. Jose Sanchez-Dehesa (UPV, Valencia), Prof. Martin Wegener (KIT, Karlsruhe), Prof. Andrea Alu (Austin, Texas), and Prof. Steven Cummer, (Duke, North Carolina). As a proof of my international distinction, I have given several plenary and keynote lecture around the world to present my line of research: Development of theoretical models and numerical methods for the design of artificial acoustic and phononic media with unusual wave properties such as negative refraction, enhanced absorptions and perfect imaging. Many of my theoretical findings have sparked new collaborations and experimental verifications, in other words, my results always had the strength to open new doors of possibilities in physical acoustics.

I am referee of the most important journals in the fields of phononics and acoustic metamaterials. The Ramon y Cajal Senior Fellowship scheme offers me the time and independence necessary to deepen and broaden my scientific activity, working towards a permanent academic post and aspiring to become a leading researcher in the mid-term.



AYUDAS RAMÓN Y CAJAL CONVOCATORIA 2015

Turno de acceso general

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Área Científica: Ingeniería Eléctrica, Electrónica y Automática
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Título:

Nanostructured thermoelectric devices for energy harvesting

Resumen de la Memoria:

I am currently a researcher at the FINDER Group (Functional Nanoscale Devices for Energy Recovering, which comprises 1 permanent researcher, 2 doctor researchers, and 5 PhD students) of the Instituto de Microelectrónica de Madrid (IMM-CSIC). The main topic of my research is the fabrication of novel thermoelectric devices for the harvesting of wasted heat for its use as electricity, as well as the study of novel nano-structures of different materials in order to enhance their properties for thermoelectric applications.

In the time I have been working in the FINDER I have focused in the optimization of thermoelectric materials to increase their efficiency in actual devices taking great interest in their miniaturization into microdevices. One way has been the optimization of chalcogenide films, which are the most widely used thermoelectric materials for room temperature applications. In this case, using the electrodeposition method, which is also widely used in industry, an increase of 33% in the Seebeck coefficient of Bi₂Te₃ films, compared with what can be found in literature for similar films has been obtained. Then, I have fabricated and characterized nanowire arrays grown with the same technique, but inside nano porous alumina templates, with diameters as small as 15 nm (the smallest reported to date via electrochemical deposition). I have also prepared and studied other thermoelectric materials, such as Sb₂Te₃, ZnO, etc. Moreover, a great effort has been done in the development of characterization tools that can measure the transport properties of these structured materials at the micro and nanoscale, as well as the importance of contact resistances and implementation issues for the fabrication of actual thermoelectric devices. All these issues are crucial when developing energy harvesters for microprocessors or microchips, for instance, that can on the one hand reduce their heating and on the other hand produce electrical energy out of this heat. Lately, the development of three dimensional nanostructured alumina templates within the group has attracted much of my attention and I am starting to study new phenomena and device possibilities based in these nano-structures with applications in fields such as spintronics, microelectronics, storage, etc.

Since May 2010, when I joined the FINDER group, I have had competences in 6 different national and international projects (such as responsible of WP3 of the Nanohitec project and one task of WP2 of the Nanotherm-Consolider project). I was responsible of a project with an American company and now I am co-IP of an industrial project with Repsol. I have organized three international workshops, including the European Conference on Thermoelectricity of 2014, I directed a Master Thesis, and I am co-director of a PhD student. Since May 2010, I have presented 29 contributions in international conferences (with one Best Oral Presentation Award in 2013 and several invited talks), published two reviews in the field of thermoelectricity, one invited view point paper and 11 articles in international journals, with an average impact factor over 4,4.

Resumen del Currículum Vitae:

My present research, covering different fabrication methods, device design and a wide variety of characterization techniques, has been possible thanks to the interdisciplinary profile acquired during my career development, since my PhD in Physics in 2007. I have worked in Integrated Optics, Astrophysics Instrumentation, Nanotechnology, Microelectronics and Thermoelectricity. I have made several stays abroad in renowned international institutes, some during my PhD (in Boston University, USA and in Bonn University, Germany) and some as a post-doc in France (Laboratoire d'Astrophysique de l'Université de Grenoble), and in Japan (National Institute for Materials Science - NIMS). Among the most relevant achievements of the first period of my research, I would highlight the thorough work developed in the field of integrated optics, where I contributed to the understanding of fundamental issues in LiNbO₃ optical waveguide devices, the starting of the fabrication and optimization of Swift Heavy Ion (SHI) irradiated optical waveguides, which have demonstrated outstanding properties for linear and nonlinear devices, and the work in the application of integrated optics to telescope interferometers for the search of extraterrestrial planets.

To summarize, 39 articles (h12) in international scientific journals have been published. I have presented my work in 41 international conferences with a total of 64 contributions, and I have participated in 9 research projects and 2 industrial projects.



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Turno de acceso general

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Referencia: RYC-2015-18047
Área Científica: Ingeniería Eléctrica, Electrónica y Automática
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Título:

Desarrollo de microdispositivos y etiquetas inteligentes para monitorización medioambiental y química basadas en nanoestructuras autoorganizadas de nuevos materiales

Resumen de la Memoria:

El candidato comenzó su carrera investigadora en la ICTS del Instituto de Sistemas Optoelectrónicos y Microtecnología (Univ. Politécnica de Madrid) trabajando como becario predoctoral FPI dentro del proyecto europeo KORRIGAN para el desarrollo de transistores de alta potencia basados en nitruro de galio (GaN). Sus tareas se realizaron simultáneamente en colaboración con el Centro de MicroAnálisis de Materiales (Univ. Autónoma de Madrid, UAM), donde el candidato obtuvo una gran experiencia en el análisis y modificación de semiconductores usando aceleradores de partículas e implantadores, tema central de su tesis (galardonada con el premio extraordinario).

Tras su defensa (en 2010) consiguió una beca de la Fundación de Ciencia y Tecnología (Portugal) para continuar trabajando en la modificación de estructuras semiconductoras con haces de iones, pero centrada en nanoestructuras avanzadas de baja dimensionalidad como pozos, hilos o puntos cuánticos en sistemas avanzados de GaN y de ZnO (compuestos ternarios y cuaternarios y heteroestructuras complejas para LEDs y transistores). Esta beca le permitió realizar una estancia post-doctoral de más de 3 años en el Instituto Superior Técnico de la Universidad de Lisboa, donde empezó una línea de investigación propia de modificación, dopaje y autoorganización de superficies e intercaras semiconductoras mediante erosión e implantación iónica. En esta línea ha destacado considerablemente en los últimos años publicando artículos en Nanotechnology, Phys. Rev. B, Mater. Sci. Eng. R-Rep (review), Appl. Phys. Lett. y consiguiendo varias charlas invitadas en congresos de alto prestigio en el campo con el MRS. Aprovechando su red de colaboraciones ha realizado estancias cortas para experimentos en el CERN, BESSY, ESRF y en varias universidades extranjeras.

Consiguió un contrato Juan de la Cierva, con el que se incorporó en 2014 al Laboratorio de Microelectrónica del Departamento de Física Aplicada de la UAM, donde trabaja actualmente dentro del proyecto nacional CTQ2014-53334-C2-2-R para el desarrollo de sensores electroquímicos orientados a la detección de enfermedades. En este marco, su experiencia previa se está utilizando para fabricar dispositivos basados en nanoestructuras organizadas como hilos y puntos cuánticos, nanogotas metálicas para plasmónica, nanoripples, etc. Además, ha impulsado la realización de dispositivos sensores basados en nuevos materiales semiconductores metaestables poco explorados como el nitruro de zinc. Estos materiales pueden crecerse de forma rápida a temperatura ambiente, sobre sustratos transparentes duros y flexibles, lo que permite integrarlos como etiquetas inteligentes en el control de procesos industriales (exposición a agentes contaminantes, oxidación de alimentos, detección de gases, humedad, temperatura, etc.). Se planea la patentabilidad de ciertos prototipos basados en estos sistemas. Sus tareas docentes han permitido integrar a nuevos estudiantes nacionales y extranjeros al grupo para ayudar en esta investigación a través de trabajos fin de grado y fin de máster. Codirigidos por el candidato estos estudiantes han obtenido excelentes resultados académicos.

El investigador JDC ha alcanzado un grado de madurez, iniciativa, capacidad de gestión e independencia muy alto, que son la base sólida para optar al contrato Ramón y Cajal en esta convocatoria.

Resumen del Currículum Vitae:

Investigador con doble formación como licenciado en Física y en Matemáticas, logrando posteriormente el grado de doctor europeo cum laude en física por la universidad autónoma de Madrid (UAM), y recibiendo además el premio extraordinario de doctorado. Durante los últimos 10 años, se ha dedicado activa y prolíficamente a la investigación, publicando unos 50 artículos, 1 libro, 2 capítulos de libro y contribuyendo con más de 70 presentaciones en congresos internacionales (16 de ellas invitadas). Durante su doctorado ha estado vinculado a la Universidad Politécnica de Madrid (Instituto de Sistemas Optoelectrónicos y Microtecnología), aunque desarrollando su actividad simultáneamente en el acelerador de iones del Centro de Microanálisis de Materiales de la UAM y en centros extranjeros de investigación a través de estancias. Ha participado y participa en proyectos científicos de ámbito nacional e internacional.

Su área de investigación es amplia, aunque se ha centrado fundamentalmente en la ciencia de materiales para electrónica. Su especialización y formación (incluyendo cursos internacionales) le ha permitido alcanzar un alto grado de experiencia en el análisis,



AYUDAS RAMÓN Y CAJAL CONVOCATORIA 2015

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modificación y crecimiento de materiales de interés tecnológico, semiconductores en su mayoría.

Realizó una estancia postdoctoral de 3 años con una beca financiada por la Fundación de Ciencia y Tecnología (Portugal), desarrollando su actividad en el Instituto Superior Técnico de la Universidad de Lisboa. Ha contribuido particularmente a la caracterización y desarrollo de heteroestructuras avanzadas para dispositivos electrónicos por medio de técnicas de haces de iones, y también a la nanoestructuración y modificación por erosión e implantación iónica. Es experto en el estudio de defectos en capas cristalinas por canalización iónica, aunque tiene formación en varias técnicas experimentales de caracterización, incluyendo el uso de grandes instalaciones como sincrotrones y aceleradores de iones. Posee la licencia de supervisor de instalaciones radiológicas y destaca además por su extensa formación en sistemas de calidad para laboratorios.

En la actualidad continúa su labor investigadora con un contrato Juan de la Cierva en el Dpto. de Física Aplicada de la UAM, donde ha reforzado su actividad docente impartiendo asignaturas de grado y master, y dirigiendo a estudiantes de grado y máster. Participa en actividades de difusión de la ciencia y ha llevado la coordinación de un proyecto de campus científicos de verano 2015 (FECYT). Posee el certificado de aptitud pedagógica.

Actualmente sigue realizando estancias breves en laboratorios internacionales como el CERN (Suiza), ESRF (Francia), BESSY, HZDR, IFK (Alemania), donde mantiene un gran número de colaboradores. Participa frecuentemente como revisor en revistas internacionales de prestigio, y forma parte de varios comités científicos, de gestión y dirección, además de haber sido miembro de varios tribunales de tesis. Es miembro de la Real Sociedad Española de Física y está acreditado como Ayudante Doctor por la ANECA.