



AYUDAS RAMÓN Y CAJAL CONVOCATORIA 2016

Turno de acceso general

Nombre: SOTO HERNANDEZ, MARCELO ALFONSO
Referencia: RYC-2016-21247
Área Científica: Tecnología Electrónica y de las Comunicaciones
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Título:

Sensores distribuidos en fibra óptica

Resumen de la Memoria:

Marcelo A. Soto received his B.Sc. and M.Sc. degree in Electronic Engineering (major in Telecommunications) from Universidad Técnica Federico Santa María (UTFSM), Valparaíso, Chile, both in 2005, and his Ph.D. degree in Telecommunications (with Honours) from Scuola Superiore Sant'Anna, Pisa, Italy, in 2011.

- In 2005 he was a Visiting Student at Centro de Pesquisa e Desenvolvimento em Telecomunicações, CPqD Research Center - Telecom & IT Solutions, Campinas, SP, Brazil.

- In 2006 he was a Lecturer of the Electronic Engineering Department at the UTFSM, Valparaíso, Chile, and visited the Center of Excellence for Communication Networks Engineering, Pisa, Italy.

- In 2009 he was a visiting Research Assistant for a period of seven months in the Group for Fibre Optics at the École Polytechnique Fédérale de Lausanne (EPFL), Switzerland.

- From 2010 until October 2011 he worked as a Research Associate at the Scuola Superiore Sant'Anna, Pisa, Italy, engaged in research projects related to distributed sensors based on Raman and Brillouin scattering.

- From November 2011, he is a Postdoctoral Researcher in the Group for Fibre Optics at EPFL, where he has been involved in the preparation and development of a wide range of research projects related to distributed optical fibre sensors based on Rayleigh and Brillouin scattering.

His main research interest is in the field of distributed optical fibre sensing. His main contribution has been the proposal and demonstration of several techniques for performance enhancement of different kinds of distributed fibre sensors. Methods such as optical pulse coding and image/video processing have represented significant breakthrough in the field becoming widely known by the international scientific community.

He is author or co-author of about 140 publications in scientific journals and international conferences, 8 patents, and 1 book chapter, all in the fields of optical communications and optical fibre sensing.

Resumen del Currículum Vitae:

Marcelo A. Soto was born in Curicó, Chile in 1981. He received his B.Sc. and M.Sc. degree in Electronic Engineering (major in Telecommunications) from Universidad Técnica Federico Santa María (Valparaíso, Chile), both in 2005, and his PhD degree in Innovative Technologies of ICT Engineering (with Honours) from Scuola Superiore Sant'Anna (Pisa, Italy), in 2011.

☐ In 2004 he was Lecturer of a Laboratory Course on Telecommunications (dedicated to 4th-year undergraduate students) at Universidad Técnica Federico Santa María.

☐ Between 2010 and 2011 he was a Research Associate at Scuola Superiore Sant'Anna.

☐ Since November 2011 he is a Postdoctoral Researcher in the Group for Fibre Optics (GFO) at EPFL Swiss Federal Institute of Technology (Lausanne, Switzerland).

His main research interests are related to application fields of optical fibres, such as optical fibre sensing, optical communications and optical signal processing.

During his career he has proposed several disruptive approaches to develop novel and advanced interrogation methods for high-performance optical fibre sensing. He is indeed author or co-author of about 140 scientific publications in highly-ranked scientific journals and international conferences, 8 industrial patents and 1 book chapter. This includes 3 major publications in Nature Publishing Group Journals (2 papers as a first author in Nature Communications, and 1 paper in Nature Light: Science & Applications).



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Dr Soto has also acquired significant experience in applying for research funding. He has contributed to the ideas behind several research projects, being funded with more than 1.4M Euro (total project costs over 3.5M Euro). He has been the project manager of a project for Helium leak localisation in the fusion reactor ITER (France), and the main technical responsible for 3 research projects: two Swiss national projects, and one project funded by the European Space Agency (ESA).

Dr Soto has been a teaching assistant of several courses at undergraduate and graduate levels, in several institutions (in Chile, Italy and Switzerland). He has also been university lecturer and has been involved in educational projects to develop new teaching material for courses on telecommunications. As a Postdoctoral Researcher at EPFL, 20% of his time has been devoted to teaching activities. This has included the preparation and supervision of lab sessions for undergraduate, master and doctoral students of several courses on fundamental photonics, nonlinear fibre optics, and optical signal processing. He has also been constantly providing technical and scientific supervision to doctoral students during their 4-year PhD program, as well as to Master and Bachelor students during their final projects. He is today regularly invited to give talks in international conferences, as well as seminar and invited lectures in universities worldwide.

Today Dr Soto, at his 35 years-old, has reached an international reputation in the field of distributed fibre sensing. The outcome of this research has been largely recognised by the international community in the field. He has established an extensive network of collaborators worldwide. He is Member of the Board of Reviewer of the most prestigious journals in Photonics (Nature group, OSA, IEEE), and Member of the Technical Program Committee of two major conferences in the field of optical fibre sensing.



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Nombre: FERNANDEZ GARRIDO, SERGIO
Referencia: RYC-2016-19509
Área Científica: Tecnología Electrónica y de las Comunicaciones
Correo Electrónico: garrido@pdi-berlin.de

Título:

Synthesis and characterization of group-III nitride compound semiconductors for the fabrication of electronic and optoelectronic devices

Resumen de la Memoria:

My research lines are mainly devoted to the synthesis and characterization of group-III nitride compound semiconductors (the material system of choice for solid-state lighting and high-power frequency electronics), in the form of epitaxial films and nanowires, for the fabrication of electronics and optoelectronics devices such as light-emitting diodes, single-photon sources for quantum information technologies, solar cells, and high-electron mobility transistors. Therefore, my research activities are a symbiosis of micro- and nano-technology, electrical and materials engineering, and solid-state physics with special emphasis on low-dimensional semiconductor structures.

During my PhD at "Instituto de Sistemas Optoelectrónicos y Microtecnología" (2004-2009), a Major Scientific Facility affiliated to Universidad Politécnica de Madrid (Spain), I investigated the synthesis by plasma-assisted molecular beam epitaxy and properties of group-III nitride compound semiconductors for the fabrication of visible and ultraviolet light-emitting diodes. Along this time, I also participated in several national R&D projects devoted to quantum optical information technologies. As a result of the studies I performed at Instituto de Sistemas Optoelectrónicos y Microtecnología as well as during 2 stays abroad in leading groups of my field [4 months at the former "Solid State Lighting and Display Center, University of California at Santa Barbara (California, USA)" and 3 months at "High Pressure Research Center of the Polish Academy of Sciences (Warsaw, Poland)"], I established several growth diagrams for the synthesis of group-III nitride compound semiconductors, elucidated some of their fundamental optical properties, and developed expertise on the fabrication and characterization of light-emitting and laser diodes. Upon completion of my PhD, I remained 8 months working as PostDoc at Instituto de Sistemas Optoelectrónicos y Microtecnología. During this period, I started to investigate the self-induced formation of GaN nanowires in plasma-assisted molecular beam epitaxy with the idea of using these nanostructures as single-photon emitters and efficient white-light sources for solid-state lighting. In 2010, I joined Paul-Drude-Institut für Festkörperelektronik in Berlin (Germany) for a 3-year PostDoc. There, I continued my studies on the formation of GaN nanowires for quantum optical communication technologies and solid-state lighting, and investigated the growth and optical properties of the (In,Ga)N quantum wells used as active region of green light-emitters. Along this time, I also work in the field of spintronics. Namely, I had a parallel research line devoted to investigate electrical spin injection into GaN using an epitaxial Fe layer as spin aligner. In 2013, I got a Permanent Position as Senior Scientist at Paul-Drude-Institut für Festkörperelektronik and became in charge of the research activities of the institute related to the synthesis of GaN nanowires by plasma-assisted molecular beam epitaxy. Since then, I have also expanded my activities to hybrid systems where group-III nitride compound semiconductors are combined with flexible metal foils, graphene, or organic semiconductors to explore novel device concepts capable to improve the performance and functionalities of GaN-based electronic and optoelectronic devices.

Resumen del Currículum Vitae:

I graduated with honors in Physics at Universidad Autónoma de Madrid in 2003. In 2004, I got a fellowship (FPU program) to carry out my PhD at Instituto de Sistemas Optoelectrónicos y Microtecnología. Along my PhD, I investigated the synthesis and properties of group-III nitride compound semiconductors, the material of choice for solid-state lighting. During that time, I performed two stays abroad in internationally recognized research centers, namely, 4 months in 2006 at the Solid State Lighting and Display Center at University California Santa Barbara (California, USA) and 3 months in 2007 at the High Pressure Research Center of the Polish Academy of Sciences (Warsaw, Poland). In parallel to my research activities, in 2008, I imparted two under-graduate courses from the Materials Engineering degree at Universidad Politécnica de Madrid (60 hours). In July 2009, I defended my thesis which received the European Academic Distinction and was evaluated as "sobresaliente Cum Laude" by an international jury. I remained as PostDoc at Instituto de Sistemas Optoelectrónicos y Microtecnología working in an European project until April 2010 when I joined Paul-Drude-Institut für Festkörperelektronik in Berlin (Germany). There, I performed a 3-year PostDoc studying hybrid ferromagnetic/semiconductor heterostructures for spintronics as well as the synthesis of group-III nitride nanowires for the fabrication of light-emitting diodes. After this period as PostDoc, in May 2013, I obtained a Permanent Position as Senior Scientist and became in charge of the research activities related to the synthesis of group-III nitride nanowires. As Permanent Senior Scientist, I have co-supervised 1 master thesis, several visitor scientists (3 PhD students and 1 associate professor), coordinated 3 national projects, and established national and international collaborations with different groups. Currently, I am the Principal Investigator of a national R&D project devoted to the analysis of hybrid inorganic/organic semiconductor interfaces (financed with 435000 € by the Bundesministerium für Bildung und Forschung) and my group consists of 2 co-supervised PhD students, 2 PostDocs (1 of them co-supervised) and 4 technicians (2 of them working at part time).



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In 2011, I obtained the accreditation as "Ayudante Doctor" from ANECA. Along my scientific career, I have been reviewer of several international journals, chairman and member of the organizing committee of international conferences, reviewed a Polish national project, taken part in 11 R&D projects (2 of them financed by the EU), co-submitted two patents, published 66 research documents (including research articles, book chapters, and reviews) and participated in 78 conference contributions. I am the first author of 11 research articles (3 Nano Lett., 1 Phys. Rev. Appl., 1 Nanotechnology, 2 Appl. Phys. Lett., 4 J. Appl. Phys.) and 1 book chapter; second author of 10 research articles (1 Nano Lett., 4 Appl. Phys. Lett., 1 Nanotechnology, 2 Cryst. Growth Des., 1 J. Appl. Phys., and 1 Phys. Status Solidi C); and group leader of 5 more (2 Nano Lett., 1 Cryst. Growth Des., 1 Nanotechnology, 1 Appl. Phys. Lett.). I have presented my work regularly at different conferences (5 invited talks, 8 talks, and 8 posters). I have received 1594 (1160) citations and my h-index is 20 (16) according to Google Scholar (Web of Science).



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Nombre: PARK , HYUK
Referencia: RYC-2016-20918
Área Científica: Tecnología Electrónica y de las Comunicaciones
Correo Electrónico: park.hyuk@tsc.upc.edu

Título:

Development of Advanced Environmental Monitoring Technologies: Small satellite platform, Sensors, and Algorithms

Resumen de la Memoria:

The candidate has a deep background in the Earth observation based on the microwave remote sensing and satellite mission applications, which are mainly used for monitoring soil moisture, biomass, surface roughness, inland water, coastal area monitoring, sea surface height, sea wind speed, salinity, water vapour and atmospheric contents, etc. In order to provide the environmental monitoring tools, the candidate has conducted many R&D projects interdisciplinary in scope, and addressed end-to-end (E2E) system solutions.

In the Ph.D. program in Korea, he trained the microwave sensor technologies as participating the real space mission, titled "Dual channel Radiometer for Earth and Atmosphere Monitoring (DREAM)", which is the first radiometer payload of a Korean satellite mission. The candidate developed the sensor simulator for the Radiometer, and conducted system solution. For his Ph.D. theme, the candidate has proposed the improved instrument configuration for L-band synthetic aperture radiometer, e.g., ESA Soil Moisture Ocean Salinity (SMOS). After obtaining the doctoral degree in Feb. 2009, the candidate joined the Remote Sensing Laboratory (RSLab) at the Universitat Politècnica de Catalunya - BarcelonaTech, as a postdoctoral researcher, and successively as a Juan de la Cierva Researcher. The UPC RSLab is a leading R&D group for developing the SMOS mission, and the candidate contributed the performance improvement for SMOS missions. The candidate has proposed novel methods to deal with Radio Frequency Interferences (RFI), which are the most serious problems impacting SMOS performance. Furthermore, he developed a generic Synthetic Aperture Radiometer Simulator for the future space missions.

Beyond the spaceborne radiometer, the candidate has contributed on the relatively brand-new instrument technology, called GNSS-Reflectometry. GNSS-R is a remote sensing techniques measuring the GNSS signals reflected over the Earth surfaces, providing information on the geophysical parameter such as sea state and soil moisture. The candidate has led the GNSS-R researches as participating the ESA-funding R&D project from the early stages of GNSS-R studies (from 2009). He contributed on instrument concept and design, field experiments, retrieval algorithms, and E2E simulations. Especially, he developed the E2E simulator selected as ESA Geros-1 space mission.

Currently, the candidate is extending his research to the Nano/Cube Satellite design and operation for Earth observation. He is also actively leading R&D projects for an ESA missions, H2020 project, and advising/mentoring the graduated students at the UPC RSLab.

Resumen del Currículum Vitae:

The candidates's significant academic contributions, such as R&D project participation and publications, are interdisciplinary in scope, e.g., telecommunications, signal/image processing, satellite system engineering, GNSS/navigation, remote sensing, geoscience, and environmental monitoring. The candidate has participated in applied R&D projects encompassing from the instrument design, operation, data processing, and environmental/geophysical parameter retrieval. Most of R&D projects are international collaboration work funded by the European Space Agency, the European Commission, Spanish Ministry of Economy and Competitiveness, the Korean Aerospace Research Institute, the Korean Agency of Defense Development, etc.

The candidate has worked in the Remote Sensing Lab (RSLab) and NanoSatLab in Universitat Politècnica de Catalunya (UPC-BarcelonaTech), which are considered as global leading group in satellite/microwave remote sensing field. He served as co-PI of several international R&D projects, and he also has been actively mentoring/advising the graduate students in RSLab/NanoSatLab; co-adviser of two graduated Ph.D. and one graduated students.

Through his career (17 years from master students), the candidate has published 46 peerreviewed journal papers, and most of them are in Q1 or less than 30 % in the field. The number of total citation is 507 (from Scopus), and the current h-indices of the candidate are 12 (in ISI), 13 (in SCOPUS), 15 (in Google Scholar). Especially two papers where the candidate served as the first author were published honorably as the Front Cover Papers in IEEE Journals. Not only the journal articles, the candidate has published practically two useful software codes, which are certificated and registered by IEEE and ESA/ESTEC, and now publicized via internet web.

The candidate has also given more than 80 conference talks/publications, about 12 invited



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seminar/colloquium talks, and written more than 20 technology transfer report/talks. In 2011, the candidate was selected as a Post‐doctoral Fellow grant (selection rate is about 15 % from applicants) by Nation Research Foundation of Korea, which supports the Korean young scientists/engineers who are working in foreign countries. The candidate was also selected as Juan de la Cierva grant holder by the Spanish Ministry of Science and Innovation, for three years (2012‐2014). He also won the 7th Duran Farell award, as a member of Research Team for the work on GNSS‐R instrumentation and applications, 2010. The candidate has been qualified for the accreditation of professor and candidate by AQU (Catalan University Quality Assurance Agency).



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Nombre: CALABUIG SOLER, DANIEL
Referencia: RYC-2016-20559
Área Científica: Tecnología Electrónica y de las Comunicaciones
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Título:

5G, Mobile and Wireless Communications, Radio Resource Management, Hopfield Neural Networks, Cooperative Multi-Point, Broadcast Channel, Multiple Access Channel, Convex optimization, Non-Coherent Reception

Resumen de la Memoria:

The main research topic of Daniel Calabuig is the optimization of the medium access control and physical layers of wireless communication systems. More specifically, Radio Resource Management (RRM), Cooperative Multi-Point (CoMP), Multi-User (MU) transmissions, and non-coherent reception have been the main research fields.

After his Ph.D. and a period of two years at Carleton University, Ottawa, Canada, with a Marie Curie International Outgoing Fellowship (IOF), he is researching in the Universidad Politécnica de Valencia (UPV) and collaborating with international partners to define the 5th Generation (5G) communication systems. His work targets the basic research development that promotes creativity and competitiveness of the industrial sector. The knowledge about non-coherent reception acquired in Canada allowed him to open new research lines in Europe inside the 5G framework. The work on this topic resulted in five international journal articles and a patent with BMW.

Since 2012, he has been involved in the European METIS and METIS-II projects, which are devoted to the definition of the 5G communication systems. METIS and METIS-II are consortiums of 29 and 23 partners, respectively, coordinated by Ericsson and including manufacturers, network telecommunications operators, academic institutions, automotive industry and research centers. Within these projects, he is proposing the use of overlapped supercells for CoMP transmissions, and non-coherent reception for high mobility scenarios. He is also studying the performance of different waveforms under lack of synchronism for Device to Device (D2D) communications. This topic on D2D grabbed the attention of HUAWEI and resulted in a collaboration project with HUAWEI ERC, Munich.

In 2014 and 2015, he was the scientific coordinator of two projects funded by BMW Munich, which studied car-to-car communications for safety and infotainment services. These projects originated three patents with BMW and two international journal articles.

In 2015, he was TPC Chair of the 81st IEEE VTC. In 2016, he was Publication Chair of the 27th IEEE PIMRC Conference. In 2017, he is guest editor of the Wireless Communications and Mobile Computing, and the Journal of Wireless Information Networks.

Resumen del Currículum Vitae:

1. Strong track of records in scientific publications and knowledge transfer

23 international journals: IEEE Communications Magazine, IEEE Transactions on Information Theory, IEEE Transactions on Intelligent Transportation Systems, IEEE Transactions on Wireless Communications (x2), IEEE Transactions on Vehicular Technology, IEEE Vehicular Technology Magazine, IEEE Signal Processing Letters, IEEE Communication Letters (x3), IEEE Access, Mathematical and Computer Modeling, Neural Computation, Neurocomputing (x2), Transactions on Emerging Telecommunications Technologies (former European Transactions on Telecommunications), Mobile Networks & Applications, Mobile Information Systems (x2), International Journal of Communications Systems, EURASIP Journal on Wireless Communications and Networking, EURASIP Journal on Advances in Signal Processing.

4 international patents (all of them extended to WO)

5 national journals.

1 book chapter.

20 international conferences.

2. Participation in outstanding research projects

Participated in 6 international and 8 national projects. Total budget: 34923087.60.

Coordinator of 3 international projects. Total budget: 304248.30.

3. Scholarships and international stays

Spanish Ph.D. scholarship (FPI)

o University of Bedfordshire, Luton, United Kingdom (4 months)



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- ☐ Marie Curie International Outgoing Fellowship (IOF) ☐ First one granted to the UPV
 - o Carleton University, Ottawa, Canada (2 years)
 - o TOBB University, Ankara, Turkey (1 month)

4. Awards

- ☐ Medalla Juan López de Peñalver. Premio Nacional de la Real Academia de Ingeniería ☐ Joven investigador del año. 2016
- ☐ Premio al mejor doctorado 2011 del área de TIC. Consejo Social de la UPV. 2011
- ☐ Premio Valencia Idea a jóvenes investigadores. Ayuntamiento de Valencia. 2009

5. Editorial and Chairing work.

- ☐ Guest editor of 2 international journals: Wireless Communications and Mobile Computing, Journal of Wireless Information Networks.
- ☐ Publication Chair of the 27th Annual IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC).
- ☐ Technical Program Committee (TPC) Chair of the 81st IEEE Vehicular Technology Conference (VTC).



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Nombre: GONZALEZ VALDES, BORJA
Referencia: RYC-2016-20280
Área Científica: Tecnología Electrónica y de las Comunicaciones
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Título:

Sensing And Imaging Systems For Security Applications Using Millimeter And Submillimeter Electromagnetic Waves

Resumen de la Memoria:

My research is geared towards the understanding, modeling and quantitative prediction of complex engineering problems, with special emphasis on the design of sensing and imaging systems for security applications using electromagnetic waves. My research is focused on the following areas: electromagnetic sensing system simulations, including wave propagation, and antenna and array design; physics-based signal processing including Compressive Sensing based imaging and optimization techniques; radar and microwave hardware design and integration, Unmanned Aerial Vehicles (UAV) and THz imaging systems. These research areas, at the level of systems and applications, are supported by a firm foundation in a more fundamental basic research:

☐ Electromagnetic sensing system computation: development and use of various numerical methods that solve Maxwell's equations in different forms, including Integral Equation Methods, Differential Equation Methods and Asymptotic Methods

☐ Hardware design and integration: specification of multiple radar components and integration of different electronic and mechanical subsystems. Design and fabrication of reflector antennas for communication and imaging systems, and printed antenna design and manufacturing.

☐ Physics-based signal processing, imaging and optimization: mathematical and signal processing algorithms for the solution of inverse problems in diverse areas such as communications, remote sensing and geophysics. These problems require the inversion of a physical model in order to recover some unknown model parameters by using a set of measured signals. This involves working on the solution of linearized ill-posed problems using different approaches as Synthetic Aperture Radar (SAR), model based inversion methods and solutions based on Compressive Sensing.

Summarizing, I strive to combine four disciplinary strengths: 1) understanding complex wave-based physical phenomena, 2) mathematical and computational modeling, 3) algorithmic signal processing, and 4) hardware development and integration. I apply these strengths in order to address and solve complex and societally important engineering problems.

Resumen del Currículum Vitae:

Borja Gonzalez-Valdes obtained his degree in Telecommunications Engineering in April 2006 from the University of Vigo, Spain, where he carried out his Ph.D. funded by MEC via a FPI fellowship (2006-2010). His PhD thesis focused on the simulation of high frequency electromagnetic phenomena and on the design of reflector antennas for space applications. During his doctoral studies he was a visiting scholar at the Gordon CenSSIS center, at Northeastern University, Boston, USA, where he became interested in the detection of explosives, particularly suicide bombers, as well as the detection of tunnels. After finishing his PhD he obtained a research position at the Signal Theory and Communication department at the University of Vigo where he continued his research, first in the development of wire antennas for nanosatellites and later in the design of reflector antennas for THz based imaging systems.

In 2011, and given his interest in the topic of the security systems, he accepted an offer to join the ALERT Center in Boston, USA, as Postdoctoral Fellow. ALERT (Awareness and Localization of Explosives-Related Threats) is a multi-university Department of Homeland Security Center of Excellence that conducts research for effective response to explosives-related threats. There, he conducted research on the design of cyber-physical sensing and imaging systems for security applications using millimeter and submillimeter electromagnetic waves.

In 2013 he was awarded a 2 years fellowship by the regional government of Galicia to continue his research stay at ALERT. In April 2015 he returned to the University of Vigo as postdoctoral fellow sponsored with a one year contract by the Xunta de Galicia. Since December 2016 he holds a postdoctoral position in the University of Vigo as Principal Investigator within the "Jovenes Investigadores" program, founded by "Ministerio de Economía, Industria y Competitividad". He is still involved in research on GPR with the ALERT Center, and also collaborates with different colleagues from University of Oviedo and Technical University of Madrid, among others.

Dr. Gonzalez-Valdes has participated in four patents for radar hardware and signal processing algorithms and methods. He is a technical reviewer for 8 of the more important journals and conferences on his field. He has authored or coauthored more than 80 publications,



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including 26 journal papers (10 of them as first author), 21 in the first quartile (Q1) of any of their disciplines, and with average impact factor over 2. His research has been presented 59 times in national and international peer reviewed conferences, obtaining three best paper awards. In the last years as postdoctoral researcher, he has co-supervised the research of more than twenty graduate and undergraduate students working at the ALERT center and in Spain and codirected two Master thesis in Spain. He currently teaches to undergrad and grad students at the University of Vigo.



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Nombre: LOPEZ MARTINEZ, MARIA NAIR
Referencia: RYC-2016-20588
Área Científica: Tecnología Electrónica y de las Comunicaciones
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Título:

Highly mismatched alloy materials to implement solar cells

Resumen de la Memoria:

The main research line where the applicant has worked is highly mismatched alloy (HMA) materials for photovoltaic solar applications. HMA is a new class of materials formed through alloying of distinctly different semiconductors. Dilute nitrides(oxides) in which column V(VI) atoms in a standard group III-V(II-VI) compounds are partially replaced with nitrogen(oxygen) are the most prominent and extensively studied HMAs. One of the salient features of these materials is a massive modification of the energy band structure produced by small changes in alloy composition. The band structure is well described by the band anti-crossing (BAC) model which has shown that some of the dilute nitrides or oxides exhibit unusual energy band structure with a narrow band of states located in the band gap of the host material, indicating that such HMAs can be used for multiband solar cells (MSC). MSC has the potential to increase the efficiency of current photovoltaic materials by breaking the compromise between voltage and current limitation inherent to single band gap semiconductors. These new solar cells were proposed to increase the efficiency of the First and Second Generation solar cells. These new materials' main feature is an energy band located inside the band gap of the regular semiconductor, thus converting a single band gap semiconductor in, at least, three-sub-band gaps semiconductor which allows absorbing photons from different spectrum region. The MSCs have been implemented by the HMA materials (GaAsN alloy) having demonstrated the work principles of these kind of solar cells. It has been the applicant, as an expert in growth and morphological, optical and electrical characterization the one who has carried out the demonstration of these principles by growing the material, as well as implementing and characterizing the device. She also has developed theoretical models to fit and to understand the experimental results and the new properties of MSC. Her studies resulted in the most important advance in the field having high number of citations being more than 1000 and presenting some of the crucial properties of these new solar cells. After her postdoctoral stay at the Lawrence Berkeley National Laboratory, she has transferred the know-how of the technology of MSC from USA to Europe being the principal investigator of the "Highly mismatched alloy materials to implement multiband solar cells" project, financially supported by European Commission. The candidate is implementing the materials using a Chemical Beam Epitaxy (CBE), and studying their properties by structural, morphological, electrical and optical characterization, having acquired deep knowledge in growth and characterization techniques. She has opened a new research line within the group leading the investigation. Currently, she has also researched in nanowires structures and thin films materials. Using a CBE system, she has grown nanowires of GaAs semiconductors and studying the growth condition to grow nanowires of different III-V semiconductors as GaP and GaAsN. Finally, she is researching in new materials used for sensor applications based-on nanowires structures.

Resumen del Currículum Vitae:

The applicant has researched in photovoltaic (PV) solar energy field realizing her European PhD at the Solar Energy Institute in "Universidad Politécnica de Madrid (UPM)". Her master degree in Fundamental Physics was obtained at the "Universidad Autónoma de Madrid (UAM)". Her research career started at the "Consejo superior de investigaciones científicas" where she awarded a junior research contract to work in physic-chemistry field. She published her first paper after 4 months working. In 2002 she started her PhD where she realized the first experimental characterization of multiband solar cell (MSC). Her studies gave the most relevance advances in the field as observed in the papers published having more than 1000 citations giving theoretical models and properties of the materials. She has an h-index of 14 (WoS) (17 if all her papers are in consideration). Nevertheless, one of her major achievements was obtained under her postdoctoral fellowship at the Lawrence Berkeley National Laboratory (LBNL) having experimentally demonstrated the first MSC. During her PhD she was awarded with 5 grants from different national and international bodies being 2 of them to stay in Glasgow and Cyprus Universities. Also, she gave lectures at the UPM and is co-author of a requested patent. After her PhD she was a Director of Research and Development Department in a private company where she was involved in building up of a research division in solar concentration, and selection and training the Research Division team. The technological breakthrough was to develop a new industrial concentration prototype and her commercial achievement was generating a research contract to obtain the 2-junction solar cell industry recipe. In 2009 she awarded a fellowship from Spanish Government to realize a postdoctoral stay in LBNL. During her stay one of the most relevant attainments that she achieved was the matchless demonstration of the MSC being a new kind of semiconductors, PRL 106, 028701 (2011). These results have pushed the group ahead of the field and generated high number of citations: 215 and 9 highlights being the most relevant bodies and journals: Nature Photonics, NASA, MIT, etc. In 2011 she awarded a second fellowship from LBNL body to follow with her studies in the MSC being recently published an Advanced Energy Materials (2016) with 16.146 impact factor and generated a United States American request patent. She also gave lectures in University of California (UC)-Berkeley and invited talks at the UC-Berkeley and SPIE Photonic Conference and is reviewer of relevant journals as Solid State Electronic or Progress in Photovoltaic: research and applications. In 2012 she got a postdoctoral contract at the UAM to work in thin films PV devices and gave Physic lectures at the "Universidad Tecnológica de Arte Digital". During this period she awarded an excellent contract from the Marie Curie Actions -



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Turno de acceso general

International Incoming Fellowship to transfer the know-how of the technology of the MSC from USA to EU being the principal investigator of "highly mismatched alloy materials to implement multiband solar cells" project. She is co-author in more than 50 papers published in journals and international conferences. Recently she has invited by European Commission as an expert in solar panel in the EU Sustainable Energy Week 2015. She gets the "Contratado Doctor" accreditation.