Nombre: PLACIDI , MARCEL
Referencia: RYC-2017-23758
Área Científica: Ingeniería Eléctrica, Electrónica y Automática
Correo Electrónico: marcel.placidi@gmail.com

Título:

Thin film processing technology optimization for new concepts of advanced photovoltaic devices

Resumen de la Memoria:

(2006-2010) PhD doctorate entitled ' Wide Band Gap Semiconductors for MEMS and Related Process Technologies' , at the "Instituto de Microelectrónica de Barcelona - Centro Nacional de Microelectrónica" (IMB-CNM-CSIC), obtaining the degree in July 2010 with the highest qualification of ' Sobresaliente Cum Laude' . The main research activities were related to the study of different innovative Wide Band Gap (WBG) materials (Silicon Carbide and III-nitrides) to evaluate their potential for sensing applications, through the development of MEMS and transistors. During the PhD thesis, he also developed own experimental techniques and tools to carry out his research, gaining remarkable experimental skills. He had also the chance of developing teaching skills being lecturer in various University Grades at the "Universitat Autònoma de Barcelona".

(2010-2011) After the PhD, he pursued a short post-doctoral stay at D+T Microelectrónica where he followed with the development of devices based on WBG semiconductors but began working partially on two industrial projects for power electronics, the first one based on the development of SiC VJFETs and the other based on the development of AlGaN/GaN HEMTs.

(2011-2012) He began then a post-doctoral stay at the NANERG (Nano-optoelectromechanical Systems for Energy Laboratory) research team at the UAB (Universitat Autònoma de Barcelona), working on the fabrication and simulation of MEMS devices integrating optical antennas.

(2012-present) Since his incorporation at IREC, he has been involved in more than 10 projects related to the synthesis/characterization/optimization of thin film solar cells, mainly with chalcopyrite (CIGS) and kesterite (CZTS) semiconductors. He has been directly involved in the achievement of champion PV devices through the optimization of key technological process steps, such as the development of CZTS solar cells with efficiencies exceeding 10% (IREC record 11.8%), which are among the highest values obtained worldwide or still the best worldwide CZTS efficiencies in a complete panoply of substrates, such as on ceramics, flexible stainless steel, polyimide and SiO2/Si with 7.5, 6.1, 4.9 and 6.2% respectively. He has also be in charge of the coordination of the research line centered in the development of innovative transparent back contacts that has allowed achieving the best worldwide CZTS bi-facial solar cell efficiency with 7.9% (on FTO/glass substrate, instead of the commonly used Mo/glass). All these records have given the group a leader profile in the research in CZTS solar cells, providing these technologies with the degree of flexibility that is required to answer to the needs in different emerging market sectors for the development of highly customized devices as BIPV and/or powering of small autonomous systems in advanced wireless sensor networks. In addition to these activities, he has also leaded the launching of a new research line centered on the development of processes for the synthesis of new 2D materials with a strong potential impact for next generation PV devices with improved performance, in collaboration with relevant groups involved in the Graphene Flagship consortium, positioning IREC as one of the few groups in Europe involved in the growth of these materials beyond graphene.
.

Resumen del Currículum Vitae:

Marcel Placidi (Nìmes, France, 1980) obtained his PhD (Excellent Cum Laude) in 2010 at the Instituto de Microelectrónica de Barcelona. His work was devoted to the development and fabrication of MEMS and transistor devices with SiC and GaN semiconductors. He worked in close collaboration with several research groups from Spain and France.

After 2 post-doc stays at D+T Microelectronica (CSIC spin-off) and in the NANERG team (Univ. Autònoma de Barcelona), he joined the Solar Energy Group of the Institut de Recerca en Energia de Catalunya (IREC) in 2012. There he worked on the development of advanced thin film solar cells based on CZTS and CIGS semiconductors. The obtained results have allowed the group achieving CZTS devices with efficiencies exceeding the 10% barrier, which are among the highest values obtained worldwide. He also did several post-doctoral stays at different academic and industrial research groups mainly within the frame of different Marie Curie actions funded by the European Commission. He was actively involved in the SCALENANO and INDUCIS FP7 European projects, where he coordinated an international team for the development of chalcogenide photovoltaic devices with new solution-based printing processes, and was also in charge of the upscaling of these technologies for their transfer to the French PV company NEXCIS Photovoltaic Technologies (former spin-off of EDF).

Marcel got a Formación Post-Doctoral (now "Juan de la Cierva") contract (FPDI-2013-18968), has supervised one PhD thesis (and one under supervision), and participated in more than 15 research projects funded by various public and private funding agencies. This has

allowed him to establish and consolidate a strong international collaborative network that includes more than 20 research groups clustering the main actors and leading groups in chalcogenide thin-films PV. Marcel has a strong involvement in the launching and coordination of international collaborative projects at IREC, including relevant H2020 projects as STARCELL (H2020-NMBP-03-2016-720907, 6.218 k€) and INFINITE-CELL (H2020-MSCA-RISE-2017-777968, 1.318k€), as well as the project MasterPV from the SOLAR-ERA.NET programe (now in phase of negotiation with the national funding agencies), where he is in charge of the coordination of relevant technological WPs. Marcel also coordinates the IREC team in the SuperPV project from the H2020 LCE10 call (now in phase of negotiation with the commission, with planned starting date in March 2018). He is PI of the National project WINCOST (ENE2016-80788-C5-1-R, 138k€), and is involved in the coordination and launching in the group of several industrial driven actions. He is coordinator of WP1 in the STARCELL European project. He has over 75 publications among which Energy Environ. Sci, Adv. Energy Materials, Nano Letters, 2D Materials, Nano Energy, Prog. Photovolt., a h-index of 20, 1356 citations (Google Scholar).

Nombre: TORRICELLI , DIEGO
Referencia: RYC-2017-23583
Área Científica: Ingeniería Eléctrica, Electrónica y Automática
Correo Electrónico: diegotorricelli@gmail.com

Título:

Bio-inspired neurorobotic and neuroprosthetic technologies for the understanding and rehabilitation of neuromotor diseases

Resumen de la Memoria:

Stroke and spinal cord injury (SCI) are two of the main causes of morbidity and mortality in the developed world. Neural Engineering and Robotic Technologies have importantly advanced in the last decade putting these technologies at the front of the candidates to optimize the rehabilitation treatments. Nevertheless, this scenario still entails three important problems. First, current robot-assisted rehabilitation is performed using rigid machines with very poor abilities to adapt to the specific needs of a patient. Second, robotic technologies usually generate a considerable amount of quantitative information, which is too complex to be managed by clinical professionals in the everyday practice. Third, while current robotic devices, e.g. exoskeletons, are rapidly approaching the market, there are no standard indicators that help costumers (e.g. clinicians, patients, caregivers) in identifying which solution better match their needs.

To cope with the aforementioned priorities, the research strategy of the candidate has been focused on three goals: (I) Understanding the neural and biomechanical mechanisms behind human coordination, (II) Developing new quantitative measures of human performance, (III) Improving the current robotic-assisted neurorehabilitation techniques.

To achieve these goals, the candidate has worked into four practical Research Lines:

1) Analysis of muscle synergies in healthy and neurologically impaired individuals. To address this line the candidate founded in 2014 the Neuromuscular Coordination Lab at the Cajal Institute of CSIC. So far, he has been supervising four PhD theses, which resulted in several journal, conference publications and chapters, and two books in neurorehabilitation.

2) Benchmarking of wearable robotics and human-like machines. During the coordination of the FP7 project H2R, the candidate created the first framework for the quantification of human-like performance, applicable to robotic and clinical fields, and covering both lower and upper limb functions. In this line, the candidate was recently appointed as Co-PI of the H2020 EUROBENCH Project, funded with 8M€

3) Development of bio-inspired methods for the diagnosis and rehabilitation of neuromotor functions. The main scope was to develop new technologies that could symbiotically interact with the patient, based on biologically motivated control paradigms. In this line, the candidate proposed different solutions of neuroprosthetic devices and diagnostic techniques, and applied them into actual rehabilitation interventions.

.

Resumen del Currículum Vitae:

The candidate received the MSc degree in Mechanical Engineering from the University of Roma TRE (Italy) in 2004 and the PhD in Biomedical Engineering from the same institution in 2009. He developed his Master's thesis at Harvard Medical School, Boston, working on innovative methods for human motion analysis. His PhD research focused on human-machine interfaces for disabled people based on computer vision and machine learning. In 2008-2009 he was the principal investigator (PI) of the project "EyePlay: a gaze-driven multimedia player for disable people" founded by the Italian government. In the same year he co-founded a spin-off company for the development of innovative human-computer interfaces. Since 2010, he is with the CSIC, as Head of the Neuromotor Coordination Lab of the Neural Rehabilitation Group. His research objective is threefold: (I) Understanding the neural mechanisms behind human coordination, (II) Developing new quantitative measures of human performance, (III) Improving the current robotic-assisted neurorehabilitation techniques. To achieve these goals, he is working on the following three Research Lines: (1) Analysis of muscle synergies in healthy and neurologically impaired individuals, (2) Benchmarking of wearable robotics and human-like machines, and (3) Development of bio-inspired methods for the diagnosis and rehabilitation of neuromotor functions.

From 2013 to 2016 he has been the scientific and technical coordinator of the European FP7 project "H2R" (www.h2rproject.eu), focused on the development of human-like robotic machines for the understanding of motor control principles. In 2015 he founded and coordinated the international community on benchmarking bipedal locomotion (www.benchmarkinglocomotion.org). In 2017 he obtained a funding of 8 million euros with the H2020 project proposal EUROBENCH, to which he was appointed as Co-PI, to develop the first Framework of Robotic Benchmarking in Europe.

In the last 10 years, the candidate has been co-directing 10 bachelor's theses, 8 master's theses, and 4 PhD theses (al defended). He co-authored more than 80 publications in indexed journals, books and conferences, edited two books on neurorehabilitation, and served as Guest editor in three Special Issues on indexed journals. He participated in 13 scientific projects (five of them European) and spent 13 months of research stays in internationally recognized centres. He organized several scientific activities, such as the Summer School on Neurorehabilitation (7 editions, SSNR2011-2017), the International Conference on Neurorehabilitation (2 editions, ICNR2012 & 2016) and 24 workshops and special sessions at international conferences. In 2015, the candidate was Associate Professor at the Universidad Carlos III de Madrid. In 2016 he obtained the Spanish ANECA certification for "Associate Professor" and "PhD Professor". From 2016, he has been collaborating with the San Pablo CEU University as associate professor. The candidate is an active referee of several journals and

conferences, and was member of the evaluation committees of 3 PhD Theses and 15 Spanish national projects.

Nombre: SEOANE IGLESIAS, NATALIA
Referencia: RYC-2017-23312
Área Científica: Ingeniería Eléctrica, Electrónica y Automática
Correo Electrónico: natalia.seoane@gmail.com

Título:

Development of simulation tools for advanced semiconductor devices

Resumen de la Memoria:

My research career falls under three main topics: development of simulation tools for advanced semiconductor devices, the study of the influence of intrinsic parameter fluctuations on performance of these devices, and optimisation of numerical algorithms and portability to new computational infrastructures.

During my research, I have worked in the development of simulation tools based on one of the simplest simulation techniques, the drift-diffusion (DD) model, and on some of the most complex and computationally demanding ones, the Monte Carlo (MC) method and the non-equilibrium Green's function (NEGF) approach. I have simulated various types of semiconductor devices: HEMTs, Si and III-V nanowire MOSFETs, DGSOIs and III-V FinFETs.

The progressive scaling of the semiconductor devices to nanometre dimensions is leading to an increase in the importance of intrinsic parameter fluctuations on device reliability and performance. Therefore, the study of the impact that these sources of variability can have in the device behaviour is extremely important in order to know which designs, materials and architectures of the devices are the least sensitive. As 3D simulations are mandatory for statistical studies of fluctuations and they require large computational times, my first research works were focused on the optimisation and analysis of several numerical methods used in semiconductor device simulation, as part of the European project "CROSSGRID. Development of GRID environment for interactive applications", and in the utilisation of parallel computing for the reduction of the simulation time. My PhD thesis (2007) dealt with the development and optimisation of a 3D parallel finite-element simulator for III-V devices based on the DD model (software registered) and its application to the study of intrinsic parameter fluctuations in HEMTs. Upon finishing my PhD, I initiated a post-doctoral research stay for two years (2007-09) at Prof. Asenov's Device Modelling group in the Univ. of Glasgow (UK), one of the most influential research groups in the field of semiconductor device simulation. During this period I developed a full-scale 3D real-space NEGF simulator that was employed to study the variability in very small Si nanowire MOSFETs. From 2009-12, as a post-doctoral researcher at the Universidade de Santiago de Compostela (USC), my research focused on: I) the adaptation of semiconductor device simulation codes for its usage in Grid and Cloud computing, 2) the development of a new approach for the discretisation of the Density Gradient algorithm and 3) 2D MC simulations of DGSOI transistors which resulted in a PhD thesis that I co-directed and 4) the study of variability effects in nanoscale IF III-V MOSFETs via 3D atomistic simulations. From 2013-15, I was a Marie Curie Intra-European Fellow at Swansea University (UK), conducting my research independently within the project "3D modelling of the performance and variability of high electron mobility transistors for future digital applications". From July 2015 I am a Research Associate at the CITIUS, USC. I have been awarded a national R&D project from the MINECO JIN 2014 call, entitled "Scaling and variability of 3D tunnel field effect nanowire transistors using Si, Ge and III-V materials".
.

Resumen del Currículum Vitae:

My research career has always possessed a multidisciplinary character, bringing together electronics and computer science in their state-of-the-art aspects. I obtained my PhD in 2007 at the University of Santiago de Compostela (USC). I have developed an important part of my post-doctoral research overseas, where I established fruitful collaborations and began new research lines. I worked for more than 4 years in three different institutions in the United Kingdom: Prof. Asenov's Device Modelling group at the Univ. of Glasgow (2007-09), the EPCC at the Univ. of Edinburgh (2011) and the Nanoelectronics Device Simulation Group at Swansea University (2013-15). In 2012, I was awarded an individual Marie Curie Intra-European Fellowship that allowed me to manage and conduct my research independently under the research project "3D modelling of the performance and variability of high electron mobility transistors for future digital applications". After that, I was awarded a national R&D project from MINECO in the "Proyectos de I+D+I para Jóvenes Investigadores sin Vinculación o con Vinculación Temporal" 2014 call, to work on the "Scaling and Variability of 3D Tunnel Field Effect Nanowire Transistors using Si, Ge and III-V Materials". From July 2015, I have been a research associate at the CITIUS, USC.

Summary of achievements: 41 peer-reviewed scientific articles published in International Journals and 3 Book Chapters. Participation in 64 International and National Conferences. Published contributions in prestigious journals of research field such as IEEE Trans. on Electron Devices (10 articles), Computer Physics Communications, IEEE Electron Device Letters (2 articles), IEEE Transactions on Nanotechnology or Physical Review E. Participation in 24 R&D projects funded by competitive calls: 5 European (PI in one of them), 5 National (PI in one of them) and 14 Regional. Post-doctoral Grants: European Marie Curie IEF (2013-15), European HPC-Europa (2011), Regional Ángeles Alvariño (2008-11), Spanish postdoctoral MEC (declined 2007). Active collaboration over the years with different universities, both national (Univ. Granada, Univ. Autonoma de Barcelona, Univ. de Sevilla) and international (Univ. Glasgow, Swansea Univ., Univ. of Notre Dame), public foundations (CESGA) and private companies (T-Solar S.A.). Large postdoctoral teaching experience at the USC in the Physics Degree and in two Official Masters of the same university. Co-supervisor of 3 PhD thesis (2011, 2016 and 2017) and several Master Theses. On-going

supervisor or co-supervisor of 2 PhD thesis on the the portability of simulation codes to GPUs and other advanced architectures. Accredited by the Aneca as profesor titular (2012) and profesor contratado doctor (2010). Registered as industrial property (2012) the simulation tool 3D-DD-FEM SIM (registration SC 328,12), a 3D Parallel semiconductor device simulator based on the drift-diffusion model and the finite-element method. Participation in communication and awareness-raising programmes, member of the organising committees of international and national conferences.

Nombre: LLORENS MONTOLIO, JOSE MANUEL
Referencia: RYC-2017-21995
Área Científica: Ingeniería Eléctrica, Electrónica y Automática
Correo Electrónico: jose.llorens@gmail.com

Título:

Antimony based quantum dots for nanoelectronics

Resumen de la Memoria:

My research line focuses on the development of new semiconductor nanoelectronic devices. At the core of my research are nanostructures of III-V semiconductors. I am particularly interested in InAs/GaAs quantum dots (QDs) alloyed with antimony (Sb). Its incorporation inside of the QD or in the cladding layer brings exciting properties. It allows for a tuning of the hole energy levels and geometry and topology of the hole wave function. I have exploited these properties in nanodevices for quantum technologies and also for solar cell devices.

I started my research career in the study of fundamental properties of III-V and III-N self-assembled quantum dots. After two stays in technological centers (ESTEC-European Space Agency and Institute of Micoelectronics of Madrid-CSIC) I have oriented my research towards applied technologies. In this period I have also worked intensively on the enhancement of optoelectronic devices. As advisor of a Ph.D. student, I have developed light-trapping strategies to boost the absorption in single and multi-junction solar cells. I have acted as PI in a tender with ESA for the development of a new solar cell concept: the photon-enhancement thermionic emitter. In addition, I have also studied emergent photovoltaic cells, mostly exploiting the presence of semiconductor QDs. In parallel, I have also worked on the design of photonic crystals for the development of low power laser diodes, successfully developing a near-thresholdless nanolaser. I have also exploited my skills in the modeling of nanocantilever for sensing applications.

Most of this work has been published in journals of the first quartile, including high impact journals like Advanced Materials, Nano Letters and Scientific Reports. I want finally to remark my involvement in initiatives with private companies in the development of numerical tools ("Sgenia soluciones" and "Lumerical Inc.") and a semiconductor devices ("KDPOF").

.

Resumen del Currículum Vitae:

Physics degree from the University of Valencia in 1999, two last years in the University of Münster as Erasmus student. Student assistant (6-months) in the group of Prof. Andrew Putnis in the Institute of Mineralogy. Granted with the FPU predoctoral scholarship and obtained the Ph.D. degree in the Applied Physics Department of the University of Valencia (cum laude) in March 2007. FPU three months stay in the group of Prof. Eoin O' Reilly, Tyndall Institute.

Before the defense of the Thesis, I was awarded an ESA's Postdoctoral Research Fellowship to join the Advanced Concepts Team of the European Space Agency (NL). Involved in many technological projects oriented towards the identification of technologies to push forward the limits of current space technology. Specialized in electromagnetic simulations of Metamaterials, coherent thermal emitters and optical coating for optimal trajectory design of interplanetary dust. Coordinated four Ariadna projects with European Universities, organized an international Workshop, member of a tender evaluation board of an ESA TRL project and a TAC member of e-Cubes FP6-IST Integrated Project among many other activities.

In May 2009, I was granted a JAE-Doc contract to work at the Institute of Microelectronics of Madrid (CNM-CSIC) providing a theoretical background to the Molecular Beam Epitaxy experimental group. Started a computational lab implementing hardware and software facilities to perform simulations of nanoelectronic devices based. Current collaborations with University Federal of Sao Paulo, Italian Institute of Technology, Jülich Research Centre, and the University of Brno.

Impact:
[ORCiD]: 0000-0002-6155-6462
[ResearcherID]: G-6109-2012
Google Scholar profile: http://scholar.google.es/citations?user=OoM_UdIAAAAJ&hl=es&oi=sra
ISI WOS: 42 publications (31 in peer-review JCR journals 28 in the first quartile), 277 cites, H index 11
Google Scholar: 60 entries, 391 cites, H index 12.
43 contributions to congresses and workshops.
Highlighting 1 Nano Lett., 3 Scientific Reports, 1 Adv. Mat. and 1 Optica
Participated in 20 R&D&I projects, 1 as PI and 4 as coordinator. Director of 1

final degree thesis (ETSIA-UPM), 1 external internship (UAM) and 2 Ph.D. students
(1 defended). Participation in 2 industrial projects on software development (AVANZA and
Lumerical Solutions Inc.) Editor of the Journal Acta Futura and reviewer of
international peer-review journals: Physical Review B, Optics Letters, Applied
Optics, Journal of Applied Physics, Semiconductor Science and Technology, IEEE
and Progress in Electromagnetic Research.