

2018-2020

Activity Report ISOM

November 2021

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Section 1

1. Description of the institute in the 2018-2020 term

1.a. Scientific-technological aspects

1.a.1. Human Resources

ISOM has presently 50 members: 45 researchers, 1 clean room engineer, 2 technicians, 1 project manager and 1 administrative assistant. Researchers from Electronics, Physics and Chemistry Departments are combining their research efforts in a truly multidepartmental and pluridisciplinary R&D Institute. Among the researchers, 23 are staff members, 4 are postdoctoral researchers, and 18 are PhD or master degree students. There are currently 7 visiting scholars performing their research at ISOM.

Research at ISOM is structured into two Research Groups: the ISOM Semiconductor Devices Group (GDS) and the ISOM Magnetic Devices Group (GDM):

Semiconductor Devices Group (Head: Fernando Calle Gómez)

GDS belong to the Institute of Optoelectronic Systems and Microtechnology of the UPM, having members from three different UPM colleges ETSI de Telecomunicación, ETSI Industriales y ETSI de Caminos, Canales y Puertos. Since its creation in 1977, GDS has always been among the top 10 research groups at UPM, according to the parameters of UPM observatory.

The different background of our doctors and PhD students (electrical engineering, material science, industrial engineering, physics, and chemistry) allows us to carry out a wide interdisciplinary activity, of high scientific quality, and with the main goal of technology transfer. GDS members have a large experience in the fields of micro and nanoelectronic materials and devices. We maintain an intense international activity by means of collaborative projects, hosting numerous foreign scientists into our research lines and promoting the international mobility of our staff members.

Magnetic Devices Group (Head: José Luis Prieto)

The Group of Magnetic Devices (GDM) began to work in magnetism almost 30 years ago and it covered from its origins both practical and fundamental aspects of magnetism. From the point of view of applied magnetism, the group has had more than 15 projects privately funded, providing solutions to different companies, AENA, Casa de la Moneda, CIRTA, CIDA, TUDOR among others, proving the capacity of GDM to take on any project with industrial applications or to spot the potential of basic science for some practical applications. The group host about 20 national and international patents, some of them have been exploited by interested companies. The GDM has participated in two European projects dedicated to deploying a new generation of magnetic sensors (SENPIMAG) and a susceptometer for space exploration (NEWTON).

Basic research in magnetism has always been a pivotal part of the group by studying the control of magnetic properties of materials. In 2004, the current group leader opened a new line on spintronics. Since then, the group has been quite active studying the properties of domain walls in magnetic nanostructure and spin transfer devices. Prove of the group ever-growing activity on fundamental magnetism is the publication in the last 10 years of 7 PRBs, 1 PRL and the only two articles of the Nature family in the history of the institute ISOM, including the first Nature Materials in the entire University.

Researchers at GDM are perfectly aware that modern quality research requires internationalization and they have been collaborating with the largest European groups on magnetism such as the University of York (Prof. Kevin O'Grady), the University of Cambridge (Prof. Neil Mathur and Prof. Russel Cowburn) and the CNRS (Julie Grollier and Vincent Cross), and even with companies such as Spintec (Prof. U. Ebels).

1.a.2. Technology Facilities

ISOM equipment consists of 2 main areas: Growth and process systems, and characterization systems. These equipments are distributed between the Cleanroom and the Characterization Laboratories:

Growth and Process Systems:

- Molecular Beam Epitaxy (MBE) Facilities (3 systems)
- Chemical Beam Epitaxy (1 system)
- Magnetron Sputtering (3 systems)
- High resolution nanolithography system (line resolution 10 nm)
- UV Photolithography (resolution $>1\ \mu\text{m}$) (2 systems)
- Metal Deposition (Joule, e-beam) (5 systems)
- Plasma Enhanced Chemical Vapour Deposition (PECVD) for oxides and nitrides
- Chemical Vapour Deposition (CVD) for Graphene
- Reactive Ion Etching (RIE)
- Inductively Coupled Plasma (ICP) Etching
- Standard annealing and Rapid Thermal Annealing (RTA) (5 systems)
- High precision blade, diamond Scriber and profilometer
- Ultrasonic and Thermocompression Microsoldering (2 systems)
- Dicing Saw

Characterization Systems:

A) Surface and Structural

- High Resolution X-Ray Diffractometer (HR-XRD)
- Scanning Electron Microscope (SEM) with EDAX
- Atomic Force Microscope (AFM)
- Electron Beam Induced Current Microscopy (EBIC)
- Thickness Profiler
- Optical Profiler

B) Electrical and Magnetic

- Electronic Systems for Characterization and Measurement (curve tracer, curve analyser, sampling oscilloscopes, nanovolt generators, lock-in amplifiers, etc.)
- Hall Effect system
- Microprobe station and systems for RF network analysis ($< 20\ \text{GHz}$)
- Carrier Traps and Defect Analysis Techniques (DLTS, DLOS, PCFRS, AS, etc.)
- Magnetic Characterization: Vibrating Sample Magnetometer (VSM)
- Alternating Gradient Field Magnetometer (AGFM)
- Fast Field Cycling (FFC) NMR Relaxometer

C) Optical

- UV, VIS and IR Electro- and Photo- Luminescence Spectroscopy (EL, PL) (2 systems)
- VIS and IR Fourier Transform Absorption Spectrometer (FTIRS) (Nicolet 760)
- High Resolution Nomarski Optical Microscope
- Cryostats (5 systems)

D) Devices

- Probe Stations (Low Capacitance) for VLSI and discrete devices (2 systems)
- Electrical and Optical Characterization at high T (up to 400°C)
- Electrical Characterization Systems for Transistors and Devices up to 1 GHz (C-V, I-V, C-f, 1/f noise, T, etc.)
- Optical Characterization of Lasers
- Optical Characterization of Detectors

1.a.3. Technological Services

Since 2000, ISOM has been certified by the Spanish government as a node of the Spanish map of Large Research Infrastructure (ICTS). The network of Clean Rooms for Micro and Nanofabrication (<https://micronanofabs.org/>). In this network ISOM offers 20% of its time to another researchers in public institutions or private companies for the development of its advanced research projects. Also ISOM provides scientific services as UPM and it is also a Laboratory of the Madrid Community.

The services available in ICTS UPM scientific services, and in the Madrid REDLAB network, respond to the research areas carried out in ISOM and to the available facilities, with the following scheme:

A) Sample growth

- Joule evaporation deposition (Au, Ag, AuGe, AuZn, Ni, etc)
- e-beam evaporation deposition (Au, Pt, Ti, Al, etc.)
- Chemical Vapour Deposition (CVD)
- Sputtering for magnetic materials (Fe, Ni, Co, FeNi, etc)
- Molecular Beams Epitaxy (MBE) for semiconductors (AlGaInAs and AlGaInN families)
- Electrodeposition of Au, Ni, CoP, etc.
- Air-bridge contacts fabrication

B) Processing techniques

- Lithography
- E-line nanolithography (line resolution > 10 nm)
- Photolithography
- Optical Mask design
- Chemical, Thermal and Mechanical Treatment
- Cleaning (Organic, acid chemicals...)
- Polishing
- Precision cutting
- Reactive Ion Etching (RIE)
- Wet Etching
- Standard Thermal Annealing
- Rapid Thermal Annealing (RTA)
- Soldering and packaging

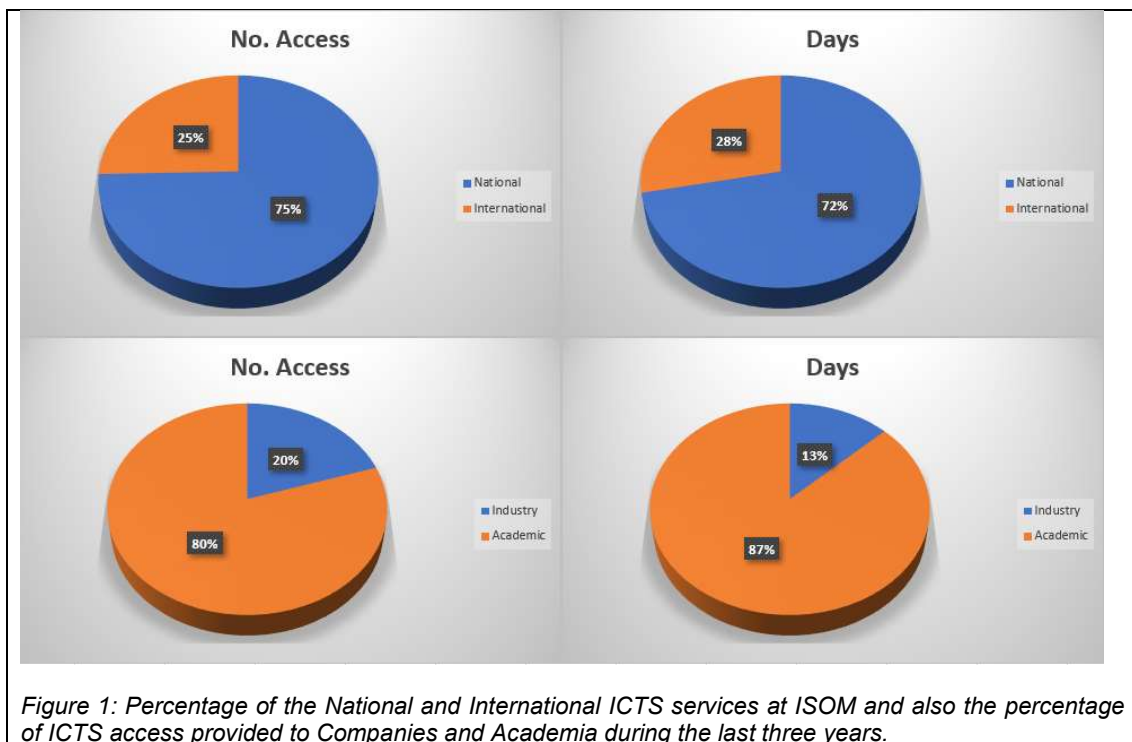
- Soldering
- TO-5 Packaging
- TO-8 Packaging
- Other Packaging

C) Sample characterization

- Optical
 - Sample preparation for measurements at both low and room temperature
 - Photoluminescence (PL) measurement (IR-VIS-UV), at temperatures within the range 10-300K
 - Electroluminescence (EL) measurement
 - FTIRS measurement (400 nm-20 microns)
- Optoelectronic
 - Device Preparation
 - Spectral responsivity for detectors measurement (from 12 micron to 200 nm)
 - Spectral laser emission measurement (from 600 to 1700 nm)
 - Spectral luminescence emission measurement (from 200 nm to 2.5 micron)
 - L-I curves in UV-VIS-IR lasers
- Electrical and Magnetical
 - Resistivity measurements, room temperature
 - Hall measurement, variable with temperature (15-300K)
 - C-V and I-V measurement at room temperature, as well as temperature and frequency dependence
 - Hysteresis Cycles for thin films
- Microscopy and Structural
 - Measurements of thickness in thin films and surface measurements
 - Contrast microscope photograph (electronic file) and polarization
- Characterization by SEM microscopy (image, catoluminescence and EDX)
- AFM and MFM Characterization
- X-Ray Diffraction Spectrum

In the last three years these technological services generated 140.000 €. The main technological services that ISOM has provided to other entities during the last 3 years can be found in [Annex A](#).

A general view of the use of this technological services can be shown in the following pie chart. One can observe that the international access is up to 25% versus the National access and up to 20% of the access came from industry versus academia.



1.a.4. Active Research Lines in the past 3 years

ISOM had several research lines and different sub-lines.

A. Microsystems and Nanotechnology:

- AlGaN / GaN and ZnMgO / ZnO HEMT transistors for high frequency and high-power applications.
- NanoFETs (nanocolumnares) with III-nitrides.
- SAW structures of AlN / diamond for high frequency.
- MEMS and NEMS for energy storage based on oxides and III-nitrides.
- Plasmonic effects with metallic nanoparticles.

Graphene: Growth and processing of devices and applications for energy storage, sensors, plasmonics and communication. Electronic devices based on graphene and 2D.

B. Optoelectronics:

- Lasers of 0.9-1.3-1.5 μm based on GaInNAs / GaAs QWs and In (Ga) As / GaAsSb QDs.
- NanoLEDs with III-nitrides for white lighting without phosphorus.
- Micro and optical nanocavities for quantum information.
- Efficient solar cells with heterojunctions of InGaN / Si and GaAsSbN / GaAs.
- MOEMS: Nanocolumns (ordered and self-assembled), Quantum Dots and Quantum Wells based on compounds III-V (InGaAsSb, InGaAlN).

C. Systems with Optical Sensors:

- Photodetection of UV and VIS: Solar radiation monitoring systems.
- UV-B with nitrides-III and with ZnMgCdO / ZnO. Integrated systems for VIS / UV fluorescence. Biosensors based on AlInGaAs for the detection of water pollutants.
- Multispectral photodetection in the IR: Multispectral integration of QWIPs of AlGaAs / GaAs and associated electronics. Photodetectors of QDs (Ga) InAs (N) / GaAs (Sb) and QWs of InGaAs / InN (1.5 μm). IR detection for environmental applications.
- Sensors based on hetero-unions of organic-inorganic semiconductors, for gas detection and photodetection.
- Integrated Nanophotonics: Biochemical sensors and micro-ring resonators. Optofluidic systems on chip.

D. Systems with Magnetic Sensors:

- Magnetometric sensors for low field measurement.
- Multisensors (Vehicle detection, ground traffic at airports, battery monitoring, etc).
- Planar devices. Applications to planar inductors for sources and antennas.
- Low frequency smart cards.

E. Spintronics:

- Metallic magnetic multilayers. Spin valves.
- Dynamics of magnetic domain walls.
- Spin transfer on magnetic walls and magnetic nanostructures

F. Simulation of Non-Metallic Materials:

- Simulation of non-metallic materials and complex fluids.
- Molecular dynamics methodology and advanced Monte Carlo techniques.
- Absorption and nanostructured materials.
- Single-molecule sensors for biomolecules (proteins and toxins).
- Embedded structures and glass-like materials.

These research lines are being revisited and will be reduced to just 3 main research lines (see [Sec.5.2](#)).

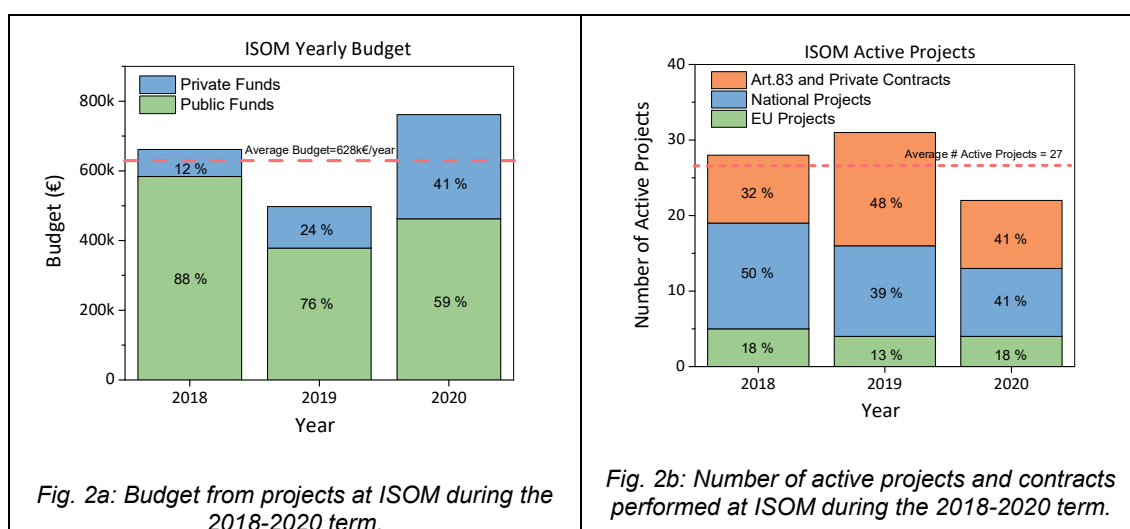
1.a.5. Budget and Funded Projects

As shown in Fig. 2a, during the 2018-2019 term, ISOM has had an average yearly budget of 628k€, reaching 725k€ in 2020. Within this budget, the weight of private vs. public funds has increased along time, from 12% in 2018, to 41 % in 2020. These private funds rely both on research contracts/Art. 83 with companies (see Fig. 2b), as well as on technological services performed as an ICTS (see 1.a.3).

Regarding the origin of the funds, the budget relies mostly on international funds, including projects from EU calls and contracts with foreign research institutes and companies, with a sustained 57% weight of the budget over the 2018-2020 term. The remaining of the budget (43%) relies on funds from national public calls, and contracts with Spanish companies and research institutes. Focusing on the origin of the public funds, and over

the 2018-2020 term, 71% of the budget has originated in national calls, whereas the resting 29% has originated from EU calls.

Figure 2b shows the number of projects and contracts performed at ISOM as a function of the year. The average yearly number of projects and contracts performed in the institute has been 27 for the 2018-2020 term, having a larger number in 2019. Eventhough the total number or projects was higher in 2019, the total budget was larger in 2020 thanks to having large contracts with companies as well as EU projects (see Fig. 2a). Indeed, the weight of the EU-funded projects is typically around 1/3 of the total number of projects funded with public funds and has been sustained along the 2018-2020 term.



The detailed list of funded projects and contracts at ISOM during the 2018-2020 term can be found in [Annex B](#).

1.a.6. Dissemination of Results

Dissemination of the results from ISOM research activities is essential for a successful achievement of the Institute objectives, both to protect its members' interest and exploitation perspectives, as well as to ensure maximum benefit for the scientific community. Basically, such activities aim to generate an effective flow of information and publicity about the targeted results of ISOM research activities.

The following is a summary of the last 3 years about the dissemination of ISOM results:

- 9 PhD. Thesis and 17 more in progress.
- 80 Presentations at National and International Conferences and 21 Invited conferences.
- 103 Papers in Scientific Journals and Proceedings papers at Conferences with strict selection.
- 9 Research Project with International Funding, 27 projects funded by public and private Spanish organisations and 6 other european collaborations projects.
- 22 Patents (from year 2010).

All the above detailed information can be found at [UPM R + D + i Observatory](#).

And the activity reports prior to 2018 can be found at this [link](#).

Most of the total number of research articles published by ISOM are JCR indexed, in the last 3 years, 37 of them are within the top Q1. The evolution of published research article can be observed in the next figure:

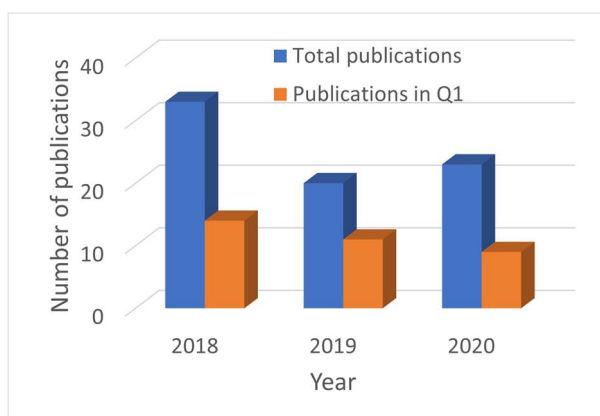


Figure 3: Evolution of the publications in the selected period.

Some selected outstanding research articles are:

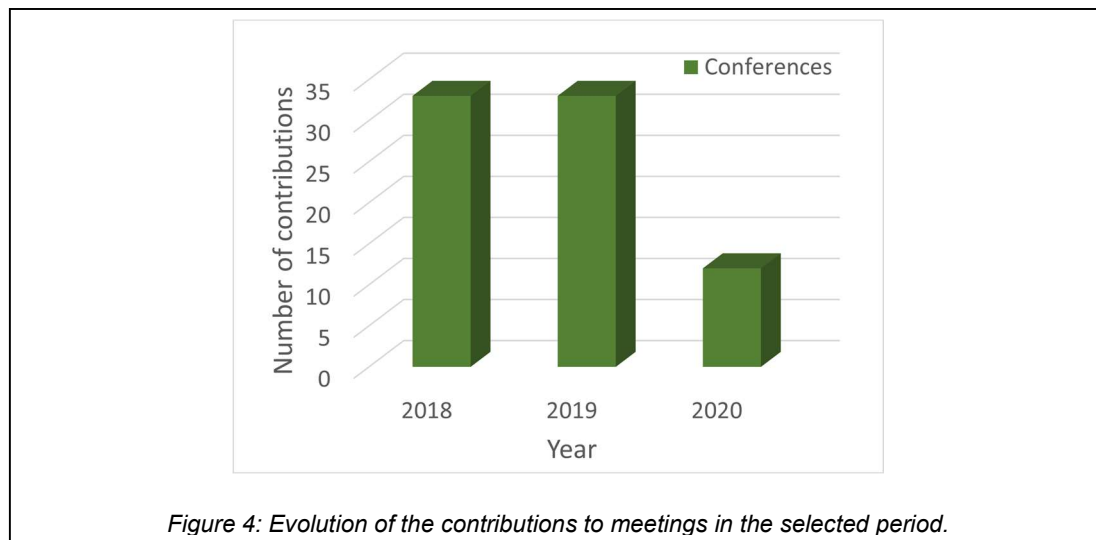
- A. Migliorini, B. Kuerbanjiang, T. Huminiuc, D. Kepaptsoglou, M. Muñoz, J.L. Fernández Cuñado, J. Camarero, C. Aroca, G. Vallejo-Fernández, V.K. Lazarov, J.L. Prieto. "Spontaneous exchange bias formation driven by a structural phase transition in the antiferromagnetic material". **Nature Materials**. Volume 17, Issue 1, Pages 28-34 (2018).
- Y. Li, V. V. Naletov, O. Klein, J. L. Prieto, M. Muñoz, V. Cros, P. Bortolotti, A. Anane, C. Serpico, G. De Loubens. "Nutation Spectroscopy of a Nanomagnet Driven into Deeply Nonlinear Ferromagnetic Resonance". **Phys. Rev. X**, 9, 041036 (2019).
- A. Hierro. M. Montes Bajo, M. Ferraro. J. Tamayo-Arriola, N. Le Biavan, M. Hugues, Jm. Ulloa, M. Giudici, J-M Chauveau, P. Genevet. "Optical Phase Transition in Semiconductor Quantum Metamaterials". **Phys. Rev. Lett.** 123, 117401 (2019)
- T.K. Hsiao, A. Rubino, Y. Chung, K.S. Son, H. Hou, J. Pedros, A. Nasir, G. Ethier-Majcher, Mj Stanley, Rt. Phillips, T.A. Mitchell, J.P. Griffiths, I. Farrer, D. A Ritchie, Cjb, Ford. "Single-photon emission from single-electron transport in a SAW-driven lateral light-emitting diode". **Nature Communications** Volume 11, Issue 1, Article number 917 (2020)
- V. Rouco, R. Ei Hage, A. Sander, J. Grandal, K. Seurre, X. Palermo, J. Briatico, S. Collin, J. Trastoy, K. Bouzehouane, A. I. Buzdin, G. Singh, N. Bergeal, C. Feuillet-Palma, J. Lesueru. C. Leon, M. Varlea, J. Santamaria, Javier. E. Villegas. "Quasiparticle tunnel electroresistance in superconducting junctions". **Nature Communications**, volume 11, 658 (2020).
- R. Fandan, J. Pedros, A. Hernández-Mínguez, F. Iikawa, P.V. Santos, A. Boscá, F. Calle. "Dynamic local strain in graphene generated by surface acoustic waves". **Nano Lett.** 2020, 20, 1, 402–409 (2020).

[Annex C](#) contains the detailed list of the research articles published in scientific journals and book chapters.

1.a.7. International and National Conferences / Meetings

Another important part of the dissemination of the results from ISOM research activities is presenting our work at conferences and workshops. These type of meetings assure collaborations with other institutions and provide essential feedback to our scientific work.

Figure 4 depicts the evolution of the number of conferences and workshops where ISOM members have sent contributions. This number of contributions is a very stable number. During years 2018 and 2019 ISOM participated in 33 meetings while this number decreased in 2020. Nevertheless, even Covid-19 pandemic was at its peak some online meetings due took place and 12 contributions were submitted.



A complete list of the contributions can be seen at [Annex D](#).

1.a.8. Invited Talks

One indicator that correlates the relevance of the research done in a specific area is the number of invited talks at conferences. Apart of the number of standard contributions, ISOM has been historically invited to several conferences thanks to the importance of the research done over the years. In years 2018 and 2019, ISOM has been awarded with 19 invited talks while in 2020, due to reduction of the conferences activities in Covid-19 pandemic, to only 2. A complete description of the invited talks can be found in [section 2 of Annex D](#).

1.a.9. Patents

While ISOM is a research institute mainly devoted to fundamental properties of semiconducting and magnetic devices, there is room for researching at the applications level. ISOM has issued 21 patents over the years (15 in Spain, 3 in the EU, 3 in the USA), a full list can be found in [Annex E](#). In the selected period 2018-2020, ISOM has requested 3 patents.

1.a.10. Ph. D. Thesis

ISOM is devoted to the training of young scientists, hence, together with Degree and Master students' training, there are always PhD candidates doing their research work at our facilities. During the last 3 years at ISOM 8 PhD theses have been finished and have started 17 more. All PhD theses presented at ISOM obtain the maximum score and the vast majority of them are labelled "Cum Laude". A detailed list of them can be extracted from [Annex F](#).

1.a.11. International projection of Researchers and Students

Within the ability of the host group to supervise students and young postdocs, it is important to mention the large experience that ISOM and Universidad Politécnica de Madrid (UPM) have hosting foreign students. The institute ISOM has a large international network of collaborations and regularly shares experiments with about 20 international research institutions mainly based in USA, Germany, France, and UK. The institute runs continuously European projects and training networks and, in the last few years, about 20% of the young PhD students and postdocs are not Spanish. Young researcher's training in ISOM is guaranteed by a complete program that has received the label of Quality Doctorate Program from the Spanish Ministry of Science and Education.

Additionally, UPM is the largest Spanish Technical University as well as a Renowned European Institution. With two recognitions as Campus of International Excellence, it is outstanding in its research activity and training of highly qualified professionals, competitive at an international level. More than 2,400 researchers carry out their activity at UPM, grouped in 200 Research Groups, 22 Research Centres or Institutes and 55 Laboratories. UPM is placed among the Spanish Universities with the greatest research activity and 1st securing competitive external resources.

UPM is the top Spanish University securing EU framework returns, participating in several international exchange programmes for undergraduate, graduate, and post-graduate students. It is one of the few Universities in Spain that offers courses in English, attracting many foreign students. A specific office is devoted exclusively to mentor overseas students and foreign visitors, helping with their arrangements in Madrid.

In 2018 and 2019, ISOM students have visited other institutions in 3 occasions and we have received 7 foreign students that remained for a full semester in our labs. Unfortunately, due to Covid-19 pandemic, from 2020 the flux of students' stays has temporary stopped.

1.a.12. Seminars

1) Seminars given at ISOM by Researchers from other Institutions:

- 2018. "Electromagnetic waves in carbon nanostructures". Dr. Maksimenko SA. Institute for Nuclear Problems, Belarusian State University, Minsk, Belarus
- 2018. "Riesgos químicos y primeros auxilios". D. Thomas Vercruysse. PREVOR Delegación España
- 2018. "Highly fabrication tolerant polarization beam splitters. Dr. Nicolás Abadía. The School of Physics and Astronomy, Cardiff University
- 2018. "Magnetic Phase Interference in Artificial Magnetic Lattices: Functions and Applications to Optical, High-Frequency, and Spin Wave Devices. - Dr. Mitsuteru Inoue. Toyohashi University of Technology, Japan
- 2018. "Nanoscale Engineering of Materials and Interfaces for High Performance Rechargeable Batteries". - Dr. Vinodkumar Etacheri. Electrochemistry Group Leader IMDEA-Materials Institute.
- 2018. "Nano-structured optoelectronic devices". - Dra. Sudha Mokkapati. The School of Physics and Astronomy, Cardiff University. UK.
- 2018. "Scanning Probe Microscopy: Exploring the Information Dimension". - Dr. Sergei V. Kalinin, Director, Institute for Functional Imaging of Materials. Oak Ridge National Laboratory (USA).
- 2018. "Quick view on our research exchange and interaction with Chongqing Univ. (China) on next perovskites and oxides photovoltaics"- Prof. Jiro Temmyo. Univ. of Shizuoka, and Chongqing Univ. (China),
- 2018. 20 years of UPM-Univ.Shizuoka cooperation on Photonic Devices based on ZnO and Related Alloys. Profs. Elías Muñoz and Adrián Hierro, Univ. Politécnica de Madrid (DIE+ISOM) and Prof. Jiro Temmyo, Univ. of Shizuoka (Japan)
- 2019. SEMINAR OF PROFESSORS: "Batteries research activities at Korea Institute of Science and Technology" Kyung Yoon Chung (Korean Institute of Science Technology), "Using Nanostructured materials to improve high capacity and fast charging battery materials" Hyung-Seok Kim (Korean Institute of Science Technology) y "Exploring new electrode materials for sodium-ion batteries" Hyung-Wan Nam (Dongguk University-Seoul), Korea.
- 2019. "b-Ga₂O₃ Materials and Devices: MBE and MOCVD Comparisons and Record Transport Properties From the Perspective of Defects". Dr. Steven Ringel. The Ohio State University, USA.
- 2019. "Exploring new electrode materials for sodium-ion batteries". Dr. Prof. Kyung-Wan Nam
- 2019. "Modelling and global optimization of MIR-THz quantum cascade lasers". Dra. Jelena Radovanovic. School of Electrical Engineering, University of Belgrade, Belgrade, Serbia.
- 2019. "Interaction of graphene related materials and cellular structures: Alterations, implications, and applications". Prof. José María Navas. Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria.
- 2019. "Using Nanostructured materials to improve high capacity and fast charging battery materials". Dr. Hyung-Seok KIM
- 2019. "Visible Light Communications Technology and System-on-Chip". Dr. Albert Wang. Dept. of ECE, University of California, Riverside, CA 92521, USA
- 2019. "New concepts for production of scalable single layer graphene oxide by local anodic oxidation of graphene". Dr. Sergio J. Quesada. Universidad Rey Juan Carlos.

-2019. "Natural proteinaceous nanoparticles for theranostic purposes". Dr. Fernando Ponz, Prof. Investigación del INIA, Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria.

-2020. "Hybrid lighting and photovoltaic devices". Dr. Rubén D. Costa. IMDEA Nanociencia

-2020. Curso online sobre el HF y su solución neutralizante Hexafluorine: Entender la gestión del riesgo químico y actuar para proteger a tus compañeros. PREVOR, ofrece curso on line de formación a los miembros del ISOM.

2) Seminars given by Researchers from ISOM-UPM:

-2018. ISOM and its magnetism. Speaker: Prof. Claudio Aroca Hernández-Ros, Director del ISOM y Catedrático del Departamento de Electrónica Física de la ETSIT-UPM. Location: ETSI de Telecomunicación

-2018. Magnetic Memories and Spintronic devices. Speaker: Prof. José Luis Prieto. Location: ETSI de Telecomunicación

-2018. Technical days of etching in devices semiconductors ISOM-UPM. Speaker: Dr. Javier Martínez, Dr. Manuel Abuín. Location: ETSI de Telecomunicación

-2018. Thirty years of Spintronics. 5 th Magnetism Spring Meeting at ICMM, CSIC. Speaker: Prof. José Luis Prieto Martín. Location: ICMM-CSIC

-2018. What can help you for your projects or company the network of cleanrooms of Micronanofabricación. Speaker: Dr. Javier Martínez Rodrigo. Location: ETSI de Telecomunicación

-2018. How to increase the impact of my publications. Speaker: Prof. José Luis Prieto Martín. Location: ETSI de Telecomunicación

-2018. Security and Safety rules. Speaker: Dr. Javier Martínez Rodrigo. Location: ETSI de Telecomunicación

-2018. International Frontier Seminars on Materials Science. Department of Materials Science of the UPM. Exchange Bias, the 2D magnetic interaction that is part of our modern life. Speaker: Dr. José Luis Prieto. Location: ETSI de Telecomunicación

-2019. Evolution of electronics and its relationship with minerals. Speaker: Dr. Miguel Ángel Sánchez Location: ETSI de Telecomunicación

-2019. Patentes y derechos de autor: Lo que todo investigador debería saber. Speaker: Dr. Fernando Calle Location: ETSI de Telecomunicación

-2019. Seminario anual de Seguridad del ISOM. Speaker: Dr. Javier Grandal Location: ETSI de Telecomunicación

-2020. Jornada: Ciclo de Vida de una Gran Instalación Científica. Speaker: Dr. Javier Martínez Location: ETSI de Telecomunicación

-2020. I Introductory course on lithography techniques and their applications, 2-3 december 2020, within the ICTS MICRONANOFABS network. Location: Online

-2020. Mesa Redonda "¿Cómo aumentar el impacto de mis publicaciones?". Speaker: Dr. José Luis Prieto. Location: ETSI de Telecomunicación

-2020. European Researchers Night. Speaker: Dra Ryu Cho-Andrés Velasco-Dr. Javier Martínez. Location: Online

-2020. «El Grafeno y los retos energéticos del futuro». Semana de la Ciencia. Speaker: Dra Ryu Cho-Andrés Velasco-Dr. Javier Martínez. Location: Online

-2020. Standard & Alternative Lithographies. "Dry etching technique for device patterning". Dr. Alberto Boscá Mojena. Location: Online

1.a.13. Communication and dissemination (Website, Twitter, Instagram)

ISOM uses both the website, and its own Twitter and Instagram accounts as a path for dissemination of news. The twitter account started in 2019 and has been very active, posting announcement, publications, ISOM celebrations, etc, and currently has 73 followers. The Instagram account started on 2021.

1.a.14. Awards and Other Achievements

-Year 2018.- Prof. Claudio Aroca, 2017 Research Award. The UPM recognizes the work of this professor of the ETSI of Telecommunications in the field of magnetic materials and nanodevices and their applications in the change of biomedicine.

-Year 2020.- Awarded the poster presented by ISOM entitled “SAW-driven plasmons in graphene heterostructures for sensing ultrathin layers” (Raúl Izquierdo-López, Dr. Jorge Pedrós, Rajveer Fandan, Dr. Alberto Boscá, Dr. Fernando Calle), among the best contributions at the international conference Graphene on line 2020, october 19-23. You can download this poster in this link: [GRAPHENE 2020 AWARDS](#)

-Year 2020.- Professor Carlos Angulo receives the UPM prize “Consolidation of research activity”. With this award, which is awarded for the first time, the Polytechnic University of Madrid recognizes its scientific contributions and its technological transfer. Links to UPM News and ISOM News.

-Year 2020.- The ZOTERAC project receives the UPM award for international research. Professor Adrián Hierro, project coordinator, and current Director of ISOM, receives the award for the scientific relevance of the results achieved and their international impact. Links in UPM News and ISOM News. Published 28.01.2020

-Year 2021.- Fernando Calle, Professor of the Department of Electronic Engineering at ETSIT, Researcher at ISOM. Project Award for Public-Private Collaboration for the SAVE project, INSPIRE UPM-REPSOL call. The quality of the Research of the ETSI of Telecommunications of the UPM, recognized by the concession to its professors and researchers of a good part of the Research prizes that the Polytechnic University of Madrid grants annually within the framework of the Santo Tomás de Aquino on 28.01.2021.

1.a.15. Collaborations

A. Companies:

- Crestec Corporation
- Yocto Technologies S.L
- REPSOL YPF, S.A
- OSRAM
- NANO4ENERGY
- New Infrared Technologies
- G2Zero
- Medlumics
- A4Cell Nanodevices
- KDPOF
- Fábrica Nacional de Moneda y Timbre, Madrid
- INDRA, Sistemas, S.A. Madrid
- Metro de Madrid

B. National Centres:

- Centro de Electrónica Industrial (UPM)
- Centro de Tecnología Biomédica (UPM)
- Centro Español de Metrología, Madrid
- Centro Láser (UPM)
- CIEMAT, Madrid
- Instituto de Ciencia de Materiales, Madrid
- Instituto de Microelectrónica de Barcelona IMB-CNM-CSIC
- Instituto de Microelectrónica de Madrid, IMM-CNM-CSIC
- Instituto Nacional de Técnica Aeroespacial (INTA)
- Universidad Autónoma de Madrid
- Universidad Carlos III de Madrid
- Universidad Complutense de Madrid
- Universidad de Alcalá de Henares
- Universidad de Barcelona, Dpto. Electrónica
- Universidad de Cádiz, Instituto de Microscopia Electrónica y Materiales (IMEYMAT)
- Universidad de Salamanca
- Universidad de Valencia
- Universidad Politécnica de Valencia
- Universidad Rey Juan Carlos, Madridentro de Electrónica Industrial (UPM)

C. International Centres:

- Air Force Research Laboratory (AFRL), (USA)
- Commissariat a l'Energie Atomique (CEA), Grenoble (France)
- CRHEA-CNRS, Valbonne (France)
- Ecole Polytechnique Federale de Lausanne (Switzerland)
- ETH Zurich (Switzerland)
- Fraunhofer IAF Institute, Fribourg (Germany)
- High Pressure Research Center, Warsaw (Poland)
- III-V Lab, París (France)
- Massachusetts Institute of Technology, M.I.T. (USA)
- National Institute of Standards and Technology (NIST), Washington, (USA)
- Naval Research Labs (USA)
- Ohio State University (USA)
- OSRAM gmbH, Regensburg (Germany)
- Paul Drude Institute (Berlin, Germany)
- Ritsumeikan University, Shiga (Japan)
- Shizuoka University (Japan)
- Technical University of Braunschweig (Germany)
- Technische Universiteit Eindhoven (The Netherlands)
- Technical University of Wien (Austria)
- The University of Cardiff (UK)
- The University of Sheffield (UK)
- The University of Cambridge (UK)
- Université Montpellier 2, Montpellier (France)
- Université Paris-Sud, Orsay (France)
- Universite Paris-Saclay (France)
- University of California, Berkeley (USA)
- University of Fukui (Japan)
- University of Giessen (Germany)
- University of Sheffield (UK)

- University of Strathclyde, Glasgow (Scotland)
- University of Warwick, Coventry (UK)

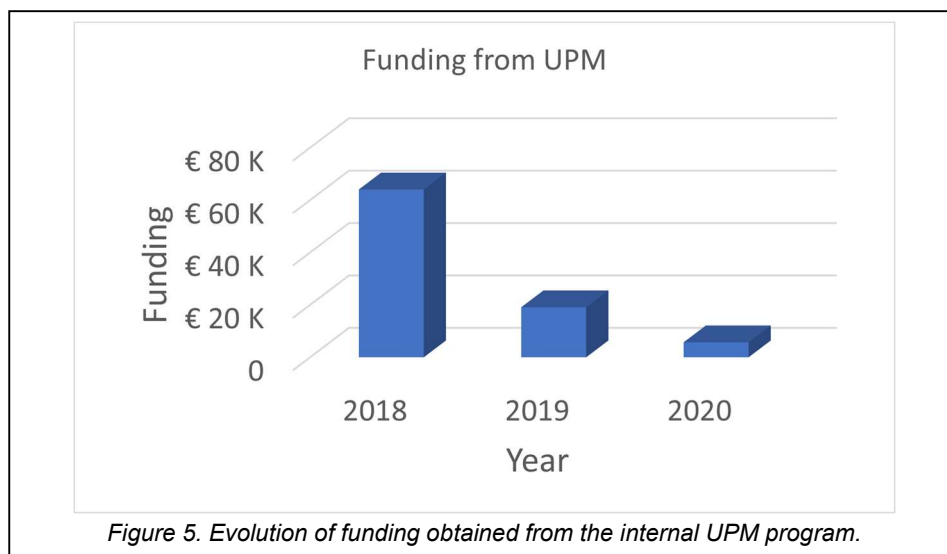
1.a.16. Networks and Platforms to which ISOM belongs

- EuroNanoLab – European cleanrooms distributed infrastructure providing world-class nanofabrication services and expertise
- Micronanofabs – Infraestructuras Científicas y Técnicas Singulares (ICTS), Ministerio de Ciencia e Innovación
- MCYT. RedLaboratorios: 285 - Instituto de Sistemas Optoelectrónicos y Microtecnología (madrid.org)
- NANOSPAIN
- MATERPLAT - Plataforma de Materiales Avanzados y Nanomateriales
- NANOMED Spain – Plataforma Española de Nanomedicina
- MERIL
- European initiative for sustainable development by Nanotechnologies | NANO futures
- EIT RawMaterials | European Institute of Innovation & Technology (EIT) (europa.eu)
- Red Española de materiales 2D
- Comunidad de Materiales Avanzados para la Sostenibilidad de la UPM
- RedNanolito

1.b. Resources received from UPM

1.b.1. Grants in OTT-UPM Projects

ISOM researchers have received funding from internal UPM programs; the following figure depicts the evolution of the achieved funding for the selected period, 2018-2020. A detailed list of the achieved projects can be found in [Annex B](#).



1.b.2. Grants in personnel contracts received from internal UPM programs

Apart from the national fellowship program to hire PhD students, UPM has a fellowship program for young researchers. In addition, the cleanroom technician has been hired from an internal UPM program. ISOM achieved funding for 1 PhD student in 2020 that will run for 3 years for an amount of 90k€. The total funding obtained to hiring for 3 years a cleanroom engineer from 2018-2020 was 120 k€. In 2021, ISOM achieved a permanente contract for the cleanroom engineer.

ANNEXES

Annex A. Technological services provided by ISOM to other entities

APPLICANT ENTITY
Dpto de Ingeniería Mecánica, Química y Diseño Industrial - Universidad Politecnica de Madrid
Dpto de Ingeniería Electrónica - Universidad Alcalá de Henares
Dpto Física Aplicada - niversidad Politecnica de Valencia
Medlumics S.L.
Dpto Física de Materiales - Universidad Complutense de Madrid
NANO4ENERGY, S.L.
Dpto de Ingeniería Mecánica - Universidad Politecnica de Madrid
Dpto Física Aplicada III - Universidad Complutense de Madrid
Dpto de Ingeniería Electrónica - Universidad Politecnica de Madrid
Rafael Advanced Defense System LTD - (ISRAEL)
Physics department - Cardiff University (UK)
Dpto Física Aplicada - Universidad de Alicante
Medlumics, S.L.
Nanomegas (Belgium)
Instituto de Micro y Nanotecnología de Madrid. CSIC
Dpto Física Aplicada - Universidad de Alicante
Dpto Física de Materiales Universidad Complutense de Madrid
Centro de Tecnología Biomédica Universidad Politecnica de Madrid
BIOD S.L
YOCTO tech.

Instituto de Micro y Nanotecnología de Madrid. CSIC
Centro de Tecnología Biomédica Universidad Politecnica de Madrid
Instituto Interuniversitario de Investigación de Reconocimiento Molecular y Desarrollo Tecnológico - Universidad Politecnica de Valencia
Centro de Tecnología Biomédica Universidad Politecnica de Madrid
Dpto Química Orgánica Universidad Complutense de Madrid
Dpto de Óptica - Universidad Complutense de Madrid
Instituto de Energía Solar - Universidad Politecnica de Madrid
CEMDATIC - Universidad Politecnica de Madrid

ANNEX B. Funding

B1. International Public Funding

- “Quantum Semiconductor Technologies Exploiting Antimony (QUANTIMONY)”. Funding Agency: EU-H2020. Contract Number: H2020-MSCA-ITN-2020, GA- 956548 (2020-2024). Partners: ISOM-UPM + 11 European universities and companies. Principal Investigator: José María Ulloa Herrero.

- “MultiscaleSolar - Multiscale in modelling and validation for solar photovoltaics”. Funding Agency: EU-H2020, Contract Number: COST Action MP 1406 (2020-2024). Partners: More than 30 European universities and research institutes. Principal Investigator: José María Ulloa Herrero.

- “Massively-Parallel Simulations for Polymer-Based Nanocomposites in the Bulk and under Confinement”. Funding Agency: EU-H2020. Contract Number: QCM-2010-3-0024 (2019-2020). Principals Investigators and Coordinators: Katerina Foteinopoulou, Manuel Laso Carbajo, Nikos Ch. Karagiannis.

- “New portable multi-sensor scientific instrument for non-invasive on-site characterisation of rock from planetary surface and sub-surfaces” (NEWTON). Funding Agency: EU-H2020. Contract Number: H2020-COMPET-2016, Topic: COMPET-5-2016, Proposal number: 730041 (2016-2019). Partners: TTI Norte, S.L., Instituto Nacional de Técnica Aeroespacial Esteban Terradas, Universitat Trier, Centre National de la Recherche Scientifique, IGU GmbH. Principal Investigator: Claudio Aroca Hernández-Ros

- “Dynamic electromechanical control of semiconductor nanostructures by acoustic fields (SAWTrain)”. Funding Agency: EU. Contract Number 642688, H2020-MSCA-ITN-2014 (2015-2019). Partners: Paul Drude Institute, Forschungsverbund Berlin. University of Cambridge, Toshiba Research Europe Limited, Universiteit Twente, Institute of Acoustics and Sensors, Consiglio Nazionale delle Ricerche, Universität Augsburg, Neel Institute, Centre National de la Recherche Scientifique, Chalmers Tekniska Högskola, Universitat de Valencia. Principal Investigator: Jorge Pedros Ayala.

- “Zinc Oxide for TeraHertz CascadeDevices (ZOTERAC)”. Funding Agency: EU-H2020. Contract Number: FET-665107 (2015-2020). Partners: UPM-ISOM, CNRS, CRHEA, Tech.Univ. Wien, ETH Zurich, Univ. Paris Sud. Principal Investigator: Adrian Hierro Cano.

- “Graphene NANOcomposites REActors at preindustrial Technology readiness, nanoGREAT”. Funding Agency: EIT Raw Materials (2016-2018). Partners: KIC Added Value Activities (KAVA) Network of Infrastructure. Principal Investigator: Fernando Calle Gómez.

B2. Other collaboration projects

- “UIDP/04968/2020 - Institute of Physics for Advanced Materials, Nanotechnology and Photonics - University of Porto”. Funding Agency: Faculdade de Ciências da Universidade do Porto. Departamento Universitário, (2021-2023). Principal Investigator: Mariana Paiva Proenca

- “Magnetic Nanofibers for 3D Racetrack Memory Devices (3DNanoMemories)”. Funding Agency: Faculdade de Ciências da Universidade do Porto. Departamento Universitário. Contract Number: PTDC/CTM-CTM/28676/2017, (2018-2021). Principal Investigator: Mariana Paiva Proenca

- “Two-dimensional Van der Waals heterostructures for novel devices”. Funding Agency: Faculdade de Ciências da Universidade do Porto. Departamento Universitário.

Contract Number: PTDC/NANMAT/ 32527/2017, (2018-2021). Principal Investigator: Mariana Paiva Proenca

- "NECL" (NORTE-01-0145-FEDER-022096), Funding Agency: Faculdade de Ciências da Universidade do Porto. Departamento Universitario, (2017-2020). Principal Investigator: Mariana Paiva Proenca

- "Project PTDC/CTM-NAN/5414/2014: New Nanogenerators for Thermal Energy Harvesting", Funding Agency: Faculdade de Ciências da Universidade do Porto. Departamento Universitario, (2016-2019). Principal Investigator: Mariana Paiva Proenca

- "Project 739797 – HarshEnergy: Perpetual Sensing in Harsh Environments: Self-powered sensors for the Oil Gas industry". Funding Agency: European EU, (2017-2018). Principal Investigator: Mariana Paiva Proenca

B3. National and Regional Public Funding

- "Fabricación en nanoescala por autoensamblaje de copolímeros". Funding Agency: Ministerio de Economía y Competitividad. Contract Number: MAT2015-70478-P (2016-2018). Principal Investigators: Nikolaos Karagiannis/Manuel Laso.

- "Crecimiento por epitaxia de haces moleculares de capas finas y nanoestructuras ordenadas de InGaN para dispositivos fotovoltaicos, sensores y generadores de hidrógeno". Funding Agency: Ministerio de Economía y Competitividad. Contract Number: MAT2015-65120-R (2016-2018). Principal Investigator: Enrique Calleja.

- "Fabricación en nanoescala por autoensamblaje de copolímeros". Funding Agency: Ministerio de Economía y Competitividad. Contract Number: MAT2015-70478-P (2016-2018). Principal Investigators: Nikolaos Karagiannis/Manuel Laso.

- "Deformabilidad de linfocitos T como biomarcador mecánico de inmunosenescencia y desarrollo de tecnología para su aplicación clínica". Funding Agency: Ministerio de Economía y Competitividad. Contract Number: MAT2016-76847-R (2016-2018). Principal Investigator: Gonzalo Fuentes Iriarte.

- "Nuevos elementos de reconocimiento molecular y amplificación química para opto(bio)sensores aplicables a seguridad alimentaria y protección personal (Neosens)". Funding Agency: Ministerio de Economía y Competitividad. Contract Number: CTQ2015-69278-C2-1-R (2016-2018). Principal Investigator: Carlos Angulo Barrios

- "Fabricación en nanoescala por autoensamblaje de copolímeros (NAFCA)". Funding Agency: Dir. General de Investigación Científica y Técnica / Subdirección General de Proyectos de Investigación, Contract Number: MAT2015-70478-P, (2016-2019). Principals Investigators: Nikolaos Karagiannis, Manuel Laso Carbajo.

- "Nanoscale Fabrication through Copolymer Self Assembly". Funding Agency: CESVIMA-UPM. Contract Number: MAT2015-70478-P, (2016-2019). Principal Investigator: Nikolaos Karagiannis.

- "Nuevas nanoestructuras basadas en SB para aplicaciones fotovoltaicas de alta eficiencia". Funding Agency: Ministerio de Economía y Competitividad. Contract Number: MAT2016-77491-C2-1-R (2016-2019). Principal Investigator: José María Ulloa Herrero.

- "Graphene-macrophage biomaterials: functional characterization for the use in cardiovascular pathologies (Biomateriales basados en grafeno-macrófagos: caracterización funcional para su aplicación en patología cardiovascular". Funding Agency: Fundación Ramón Areces 2016. Contract Number: XVIII Concurso Nacional de Ayudas a la Investigación en Ciencias de la Vida y de la Materia (2017-2019). Principal Investigator: Fernando Calle Gómez.

- "Fabricación y caracterización de nanodispositivos magnéticos con aplicaciones en magnónica y sistemas de gran acoplo espin órbita (MAGORBIT)". Funding Agency:

Ministerio de Economía y Competitividad. Contract Number: MAT2017-87072-C4-3-P (2018-2020). Principal Investigator: José Luis Prieto Martín.

- "Estudios RF de Heteroestructuras para aplicación en dispositivos magnónicos (HEDIMAG)". Funding Agency: Ministerio de Economía y Competitividad. Contract Number: MAT2017-87072-C4-4-P (2018-2020). Partners: CSIC-ISOM. Principal Investigator: Manuel Muñoz

- "Dispositivos de Grafeno para la mejora de las energías renovables (DIFRAGEN)". Funding Agency: Ministerio de Economía y Competitividad. Contract Number: ENE2017-88065-C2-1-R (2018-2021). Partners: CIEMAT-ISOM. Principal Investigator: Javier Martínez Rodrigo.

- "Plasmónica basada en óxidos para fotodetectores de IR (OXIPLIR)". Funding Agency: Ministerio de Economía y Competitividad. Contract Number: TEC2017-85912-C2-1-R (2018-2021). Partners: Universidad de Valencia, UPM-ISOM. Principal Investigator and Coordinator: Adrian Hierro Cano.

- "Transductores avanzados, biochips y plataformas de lectura para biosensores de alto rendimiento detección de líquidos y monitorización de células ". Funding Agency: Ministerio de Economía y Competitividad. Contract Number: TEC2018-84846-R (2018-2021). Principal Investigator: Carlos Angulo Barrios.

- "Graphene-based polaritonics (GRAPOL)". Funding Agency: Comunidad de Madrid, Contract Number: Convocatoria de Proyectos Jóvenes Investigadores UPM (2019-2020). Principal Investigator: J. Pedrós.

- "Nuevos materiales bidimensionales: caracterización, propiedades y aplicaciones (NMAT2D-CM)". Funding Agency: Comunidad Autónoma de Madrid, (2019-2022). Principal Investigator: Fernando Calle Gómez.

- "Nanohilos basados en GaN para sistemas de información cuántica y circuitos digitales (GANQUBIT)". Funding Agency: Ministerio de Economía y Competitividad. Contract Number: RTI2018-097338-B-I00 (2019-2021). Principal Investigator: Miguel Ángel Sánchez-García.

- "Antimoniuros cuánticos para fotónica cuántica y fotovoltaica: fabricación de materiales y dispositivos (QUANTIMONICS2)". Funding Agency: Ministerio de Ciencia, Innovación y Universidades. Contract Number: PID2019-106088RB-C32 (2020-2023). Principal Investigator: José María Ulloa Herrero.

B4. Contracts with Companies

- "Avances estratégicos en materiales mediante impresión digital (IMPRIME)". Company/Center: Empresa Afford a través del Programa estratégico CIEN del CDTI. Contract Number: PCD15-0920B-146 (2014-2018). Principal Investigator: Manuel Laso Carbajo.

- "InGaN and AlGaIn semi-polar and non-polar pseudo-substrates made by Molecular Beam Epitaxy by ordered coalescence nanocrystals". Company/Center: Fengie Xie. Contract Number: F/03/00/01-IEL.EMM.001 (FUNDETEL) (2017-2018). Principal Investigator: Enrique Calleja Pardo.

- "Servicios Científicos prestados por el ISOM a Universidad de Valladolid". Company/Center: Mari Luz Rodriguez-Universidad de Valladolid. Contract Number: F/03/00/01-IEL.EMM.001- Ab. Universidad de Valladolid fra 0325/2017 (2018). Principal Investigators: Adrián Hierro Cano and Javier Martinez Rodrigo.

- "Servicios Científicos prestados por el ISOM a Universidad Politécnica de Madrid". Company/Center: Universidad Politécnica de Madrid. Contract Number: F/03/00/01-IEL.EMM.001- Ab. Universidad Politécnica de Madrid fra 0128/2018 (2018). Principal Investigator: Adrián Hierro Cano and Javier Martínez Rodrigo.

- "Servicios Científicos prestados por el ISOM a Nano4Energy S.L.". Company/Center: Nano4Energy. Contract Number: F/03/00/01-IEL.EMM.001-Ab.

Nano4Energy, fra 0332/2018 (2018). Principal Investigator: Adrián Hierro Cano and Javier Martínez Rodrigo.

- “Servicios Científicos prestados por el ISOM a Universidad Complutense de Madrid”. Company/Center: Facultad de Ciencias Físicas de la Universidad Complutense de Madrid: Rocío Ranchal. Contract Number: F/03/00/01-IEL.EMM.001- Ab. Universidad Complutense de Madrid fra 0134/2018 (2018). Principal Investigator: Adrián Hierro Cano and Javier Martínez Rodrigo

- “Servicios Científicos prestados por el ISOM a CSIC-IMN”. Company/Center: CSIC-IMN. Contract Number: F/03/00/01-IEL.EMM.001- Ab. Agencia Estatal CSIC-IMN fra 0283/2018 (2018). Principal Investigator: Adrián Hierro Cano and Javier Martínez Rodrigo.

- “Servicios Científicos prestados por el ISOM a MEDLUMICS S.L”. Company/Center: MEDLUMICS S.L. Contract Number: F/03/00/01-IEL.EMM.001- Ab. Medlumics fra 0254/2018 (2018). Principal Investigator: Adrián Hierro Cano and Javier Martínez Rodrigo

- “InGaN and AlGaIn semi-polar and non-polar pseudo-substrates made by Molecular Beam Epitaxy by ordered coalescence of nanocrystals”. Company: Fengie Xie. Contract Number: ISO ECP 002 (FUNDETEL) (2018-2020). Principal Investigator: Enrique Calleja Pardo.

- “Uso y entrenamiento con el microscopio de electrones del ISOM para visualización de películas delgadas y nanotubos de carbono en la actividad de investigación del proyecto VAGI18MCL”. Company/Center: UPM-CTB: Miguel Holgado. Contract Number: PSC180920B251-C.I. 2019/5912 (2019). Principal Investigator: Adrián Hierro Cano and Javier Martínez Rodrigo.

- “Servicios Científicos del ISOM con empresa israelí”. Company/Center: Rafael. Contract Number: F/03/00/01-IEL.EMM.001- Ab. Rafael fra 0167/2019 (2019). Principal Investigator: Adrián Hierro Cano and Javier Martínez Rodrigo.

- “Servicios Científicos prestados por el ISOM a Universidad de Valladolid”. Company/Center: Mari Luz Rodriguez-Universidad de Valladolid. Contract Number: F/03/00/01-IEL.EMM.001- Ab. Universidad de Valladolid fra 0002/2018 serie D (2019). Principal Investigators: Adrián Hierro Cano and Javier Martinez Rodrigo.

- “Servicios Científicos prestados por el ISOM a Grupo investigador”. Company/Center: José Manuel Moya. Universidad Politécnica de Madrid. Contract Number: F/03/00/01-IEL.EMM.001- Ab. UPM fra 0068/2019 (2019). Principal Investigator: Adrián Hierro Cano and Javier Martínez Rodrigo.

- “Servicios Científicos prestados por el ISOM a Biod S.L”. Company/Center: BIOD S.L. Contract Number: F/03/00/01-IEL.EMM.001- Ab. Biod, s.l. fra 0152/2019 (2019). Principal Investigator: Adrián Hierro Cano and Javier Martínez Rodrigo.

- “Servicios Científicos prestados por el ISOM a UPM a Grupo Investigador”. Company/Center: Mar Cogollo-Universidad Politécnica de Madrid. Contract Number: F/03/00/01-IEL.EMM.001 -Ab. Universidad Politécnica de Madrid fra 0150/2019 (2019). Principal Investigator: Adrián Hierro Cano and Javier Martínez Rodrigo.

- “Servicios Científicos prestados por el ISOM a Universidad de Alicante”. Company/Center: Universidad de Alicante. Contract Number: F/03/00/01-IEL.EMM.001 - Ab. Universidad de Alicante fra 0139/2019 (2019). Principal Investigator: Adrián Hierro Cano and Javier Martínez Rodrigo.

- “Uso y entrenamiento sistemas de litografía por haz de electrones del ISOM, para dispositivos fotónicos”. Company/Center: UPM-CTB: Miguel Holgado. Contract Number PSC18092B251-CI. 2019/5915 (2019). Principal Investigator: Adrián Hierro Cano and Javier Martínez Rodrigo.

- “Servicios Científicos prestados por el ISOM a grupo investigador”. Company/Center: Mateo Burgos-Universidad Politécnica de Madrid. Contract Number:

F/03/00/01-IEL.EMM.001- Ab. UPM fra 0089/2019 (2019). Principal Investigator: Adrián Hierro Cano and Javier Martínez Rodrigo.

- "Servicios Científicos prestados por el ISOM a la Universidad de Cardiff". Company/Center: Diana Huffaker-Universidad de Cardiff. Contract Number: F/03/00/01-IEL.EMM.001-fra 0060/2019 (2019). Principal Investigator: Adrián Hierro Cano and Javier Martínez Rodrigo.

- "Convenio Huawei-UPM". Company/Center: HUAWEI. Contract Number: F/03/00/01-IEL.EMM.001-Ab. Huawei Technologies Canada fra 0302/2018 (2019). Principal Investigator: Gonzalo Fuentes Iriarte.

- "Servicios Científicos prestados por el ISOM a Biod S.L.". Company/Center: BIOD S.L. Contract Number: F/03/00/01-IEL.EMM.001- Ab. Biod, s.l. fra 0261/2019 (2019). Principal Investigator: Adrián Hierro Cano and Javier Martínez Rodrigo.

- "Convenio Yocto-ISOM: Proyecto TAG con microprocesador desarrollado con Nanotecnología". Company/Center: Yocto Technologies. Contract Number: ISO.JMR.001 (FUNDETEL) (2019-2020). Principal Investigator: Javier Martínez Rodrigo.

- "Nuevas Tintas Inkjet en base acuosa para cabezales piezoeléctricos "PRINTINK". Company/Center: Empresa Afford. Contract Number: Programa del plan estratégico CIEN del CDTI, CEMITEC, UPM. (2019-2021). Principal Investigator: Manuel Laso Carbajo.

- "Materiales y dispositivos optoelectronicos basados en nitruros del grupo-III". Company/Center: Fengie Xie. Contract Number: ISO ECP 000 LINEA DE INVESTIGACION (FUNDETEL) (2019-2025). Principal Investigator: Enrique Calleja.Pardo

- "Corte de obleas por técnico, 7 horas" Company/Center: UPM-CTB: Miguel Holgado. Contract Number: PSC180920B251-C.I. 2020/5714 (2020). Principal Investigator: Adrián Hierro Cano and Javier Martínez Rodrigo.

- "Uso de la sala limpia del isom en infraestructuras de nanolitografía: ICP, SEM, y cortadora" Company/Center: UPM-CTB: Miguel Holgado. Contract Number: PSC180920B251-CI. 2020/5462 (2020). Principal Investigator: Adrián Hierro Cano and Javier Martínez Rodrigo

- "Uso de las ICTS del ISOM según necesidad de Luca Tramarín durante el periodo detiempo comprendido entre 1-9-2020 y 30-11-2020". Company/Center: UPM-CTB: Miguel Holgado. Contract Number: PSC 180920B251- CI. 2020/8079 (2020). Principal Investigator: Adrián Hierro Cano and Javier Martínez Rodrigo.

- "Servicios Científicos prestados por el ISOM a la Universidad Complutense de Madrid". Company/Center: Facultad de Físicas de la Universidad Complutense de Madrid: Rocío Ranchal. Contract Number: ISO.AHC.002. Encargo -Ab. Universidad Complutense de Madrid fra 0138/2020 (2020). Principal Investigator: Adrián Hierro Cano and Javier Martínez Rodrigo.

- "A. Develop process to make full visible spectrum display emitter layer using nanocolumns. B. Develop process to make UVA emitting arrays using nanocolumns". Company/Center: Two Photon Research Canadá Inc.-ISOM. Contract Number: ISO.ECP.004 (2020-2021). Principal Investigator: Enrique Calleja Pardo.

- "Microfabricacion de dispositivos optoelectronicos en GaAs". Company/Center: Instituto de Micro y Nanotecnología (CSIC) -CNM-ISOM. Contract Number: ISO.JUH.001 GaAs (2020-2021). Principal Investigator: José María Ulloa Herrero.

- "LIQUIDMASS de dispositivos resonadores micro-nanométricos". Company/Center: CSIC/IMN-CNM. Contract Number: ISOJMR.002LIQUIDMASS (2020-2021). Principal Investigator: Javier Martínez Rodrigo.

B5. Funding obtained in internal UPM Programs

Year 2018

- Ayuda Al Grupo De Dispositivos Magnéticos Del ISOM, Reference OTT-UPM: DATOS VAGI18JLPM, PI: Prieto Martín, Jose Luis. Total: 2871,00€
- Ayuda Al Grupo De Dispositivos Semiconductores Del ISOM, Reference OTT-UPM: DATOS VAGI18FCG. PI: Calle Gómez, Fernando. Total: 6603,0€
- Convocatoria De Ayudas Para Promover La Participación De Los Investigadores Upm En El Programa H2020. Reference OTT-UPM: DATOS VNUEVASINV18JMU. PI: Ulloa Herrero, Jose Maria. Total: 600,00€
- Programa Propio: Ayudas A Proyectos De I+D De Investigadores Posdoctorales. Reference OTT-UPM: DATOS VJIDOCUPM18JGQ. PI: Grandal Quintana, Javier. Total: 10000,00€
- Programa Propio: Ayudas A Proyectos De I+D De Investigadores Posdoctorales. Reference OTT-UPM: DATOS VJIDOCUPM18JPA. PI: Ayala Pedros, Jorge. Total: 10289,51€
- Convocatoria Emprendimiento Infraestructuras. Reference OTT-UPM: DATOS VEMPRINFUPM17CAHR. PI: Aroca Hernández-Ros, Claudio. Total: 33677,0€

Year 2019

- Ayuda Al Grupo De Dispositivos Magnéticos Del Isom. Reference OTT-UPM: DATOS VAGI19JLPM, PI: Prieto Martín, José Luis. Total: 3047,81€
- Ayuda Al Grupo De Dispositivos Semiconductores Del Isom. Reference OTT-UPM: DATOS VAGI19FCG, PI: Calle Gómez, Fernando. Total: 6407,95€
- Programa Propio 2019: Ayudas A Proyectos De I+D De Investigadores Posdoctorales - Ayudas Dirigidas A Fortalecer Sus Planes De Investigación. Reference OTT-UPM: DATOS VJIDOCUPM19JGQ, PI: Grandal Quintana, Javier. Total: 5000,00€
- Programa Propio 2019: Ayudas A Proyectos De I+D De Investigadores Posdoctorales - Ayudas Dirigidas A Fortalecer Sus Planes De Investigación. Reference OTT-UPM: DATOS VJIDOCUPM19JPA, PI: Pedros Ayala, Jorge. Total: 5000,00€

Year 2020

- Ayudas De Reinicio De Actividad Investigadora Para Protección Personas Por Covid. Reference OTT-UPM: DATOS VCATALOGO20CC, PI: Hierro Cano, Adrian. Total: 2596,79€
- Programa Propio: Conv. Ayudas Para Fomento De La Colaboración Entre Infraestructuras De I+D+I Interdisciplinarias: Ponencias En Congresos (26.07-322L). Reference OTT-UPM: DATOS VDIFUSUPM20AHC, PI: Hierro Cano, Adrian. Total: 793,96€
- Programa Propio: Convocatoria De Ayudas Para La Publicación En Revistas Q1 De Acceso Abierto Ayudas Para Financiar Gastos De Organización De Eventos En La UPM. Reference OTT-UPM: DATOS VOPEN20JLPM, PI: Prieto Martín, Jose Luis. Total: 1490,00€
- Programa Propio: Convocatoria De Ayudas Para La Publicación En Revistas Q1 De Acceso Abierto Ayudas Para Financiar Gastos De Organización De Eventos En La UPM, Reference OTT-UPM: DATOS VOPEN20NK, PI: KARAGIANNIS, NIKOLAOS. Total: 831,66€

ANNEX C. Papers in Scientific Journals and Books

Besides standard academic activity of publishing the R&D results in scientific journals of high impact and on international scientific workshops and conferences, we will write articles in technical or professional magazines to present highlights of the projects to potential end users. These might, on the one hand, come from the semiconductor industry in general and on the other hand from specific Companies focusing on specific areas targeted by ISOM research activities.

It is worth to mention that in the period 2018-2021 more than 100 papers have been published by ISOM members in international scientific journals of high impact index.

YEAR 2018

-U. Aeberhard, A. Gonzalo, J.M. Ulloa. "Photocarrier extraction in GaAsSb/GaAsN type-II QW superlattice solar cells". Applied Physics Letters. Volume 112, Issue 21, 213904 (2018)

-P. Aseev, Z. Gačević, J.M. Manuel, J. Jimenez, R. Garcia, F.M. Morales, E. Calleja. "Formation mechanisms of single crystalline InN quantum dots obtained via droplet epitaxy and solid state dewetting". Journal of Crystal Growth. Volume 493, Pages 65-75 (2018)

-C.A. Barrios. "A deflection optical sensor based on a Scotch tape waveguide with an integrated grating coupler". Sensors and Actuators, A: Physical, 269, 500-04 (2018)

-P. Bartolomé, M Maicias, N. Biskup, M. Varela, R. Ranchal. "Investigation of the Out of Plane Component of the Magnetization of [Fe 72 Ga 28 (x nm) /Tb 33 Fe 67 (50 nm)] 2 Multilayers". Physica Status Solidi (A) Applications and Materials Science. Volume 215, Issue 19, Article number 1800183 (2018). <https://doi.org/10.1002/pssa.201800183>

-J. Benito, N.C. Karayiannis, M. Laso. "Confined polymers as self-avoiding random walks on restricted lattices". Polymers. Volume 10, Issue 12, number 1394 (2018)

-V. Braza, D.F Reyes, A. Gonzalo, A.D., Utrilla, J.M. Ulloa, S. Flores, T. Ben, D. González. "Compositional inhomogeneities in type-I and type-II superlattices for GaAsSbN-based solar cells: Effect of thermal annealing". Applied Surface Science. Volume 459, Pages 1-8 (2018)

-R. Fandan, J. Pedrós, A. Boscá, J. Martínez, F. Calle. "Acoustically-driven surface and hyperbolic plasmon-phonon polaritons in graphene/h-BN heterostructures on piezoelectric substrates". The magazine Europhysics News (vol. 49 n. 4) of the European Physical Society highlights this recent article in its review entitled "Nanoscale light trapping in graphene / h-BN by sound waves" J. Phys. D: Appl. Phys. 51, 204004 (2018). doi: <https://doi.org/10.1088/1361-6463/aab8bd>

-Z. Gao, M.F. Romero, F. Calle. "Thermal and Electrical Stability Assessment of AlGaIn/GaN Metal–Oxide–Semiconductor High-Electron Mobility Transistors (MOS-HEMTs) With HfO₂ Gate Dielectric". IEEE Transactions on electron devices, vol. 65, n. 8 (2018)

-V.J. Gómez, J. Grandal, A. Núñez-Cascajero, F.B. Naranjo, M. Varela, M.A. Sánchez-García, E. Calleja. "Effect of different buffer layers on the quality of InGaIn layers grown on Si", AIP Advances, Volume 8, Issue 10, 1 October 2018, Article number 105026 (2018)

- Z. Gačević, N. Vukmirović. "Effective Refractive-Index Approximation: A Link between Structural and Optical Disorder of Planar Resonant Optical Structures". *Physical Review Applied* Volume 9, Issue 6, Article number 064041 (2018)
- A. Guzman, R. San-Roman, R. Gargallo-Caballero, T.H. Grahm. "Laterally Biased Quantum-Well Infrared Photodetectors Operating at Room Temperature with Low Dark Currents". *IEEE Journal of Selected Topics in Quantum Electronics*, 24, 2, 7924414 (2018)
- G. Ielasi, P. Hui, C. Palacio, E. Muñoz, G. Orellana, "Silane control of the electron injection and oxygen sensitivity of dye-silane-GaN hybrid materials for luminescent chemical sensing". *Sensors and Actuators, B: Chemical*, vol. 254, January 2018, 926-934 (2018)
- A. Jollivet, B. Hinkov, S. Pirotta, H. Hoang, S., Derelle, J. Jaeck, M. Tchernycheva, R. Colombelli, A. Bousseksou, M. Hugues, N. Le Biavan, J. Tamayo-Arriola, M. Montes Bajo, L. Rigutti, A. Hierro, G. Strasser, J-M. Chauveau, F.H. Julien. "Short infrared wavelength quantum cascade detectors based on m-plane ZnO/ZnMgO quantum wells". *Applied Physics Letters*. Volume 113, Issue 25, number 251104, (2018)
- N. C. Karayiannis, M. Laso. "Absorption" BOOK CHAPTER. in *Kirk-Othmer Encyclopedia of Chemical Technology*, Wiley (2018). DOI: 10.1002/0471238961.0102191519201503.a01.pub3
- P. Kumar, P. Devi, P.E.D Soto Rodriguez, R. Jain, N. Jaggi, R.K Sinha, M. Kumar. "Structural, optical and Carrier dynamics of self-assembled InGaN nanocolumns on Si (111)" *Superlattices and Microstructures*. Volume 117, pages 25-30 (2018)
- P. Kumar, P. Devi, P.E.D, Rodriguez, M. Kumar, V.D. Shivling, R. Noetzel, C. Sharma, Rk. Sinha, M. Kumar. "Ultrafast Carrier dynamics of In_xGa_{1-x}N nanostructures grown directly on Si (111)". *Optical Materials* Volume 79, Pages 475-479 (2018)
- L. López-Conesa, J.A. Pérez-Omil, Ž. Gačević, E. Calleja, S. Estradé, F. Peiró, "Unveiling GaN Polytypism in Distributed GaN/InAlN Bragg Reflectors Through HRTEM Image Simulation". *Physica Status Solidi A*. 215(19):1800218 (2018).
- JM. Llorens, V. Lopes-Oliveira, V. López-Richard, J.M. Ulloa, B. Alen. "From Dot to Ring: Tunable Exciton Topology in Type-II InAs/GaAsSb Quantum Dots". BOOK CHAPTER. *NanoScience and Technology*, 2018, pages 57-88 (2018)
- A. Migliorini, B. Kuerbanjiang, T. Huminiuc, D. Kepaptsoglou, M. Muñoz, J.L. Fernández Cuñado, J. Camarero, C. Aroca, G. Vallejo-Fernández, V.K. Lazarov, J.L. Prieto. "Spontaneous exchange bias formation driven by a structural phase transition in the antiferromagnetic material". *Nature Materials*. Volume 17, Issue 1, Pages 28-34 (2018), doi: 10.1038/NMAT5030.
- M. Montes Bajo, J. Tamayo-Arriola, M. Hugues, Jm. Ulloa, Nolwenn Le Biavan, R. Peretti, F. H. Julien, J. Faist, J-M Chauveau, A. Hierro. "Multisubband Plasmons in Doped ZnO Quantum Wells". *Physical Review Applied*, Editor's Suggestion, vol. 10, 024005 (2018), doi: <https://doi.org/10.1103/PhysRevApplied.10.024005>
- M. Montes Bajo, J. Tamayo-Arriola, N. Le Biavan, J. M. Ulloa, P. Venegues, D. Lefebvre, M. Hugues, J.-M. Chauveau, A. Hierro. "Breaking the Intersubband Selection Rules for Absorption with ZnO Quantum Wells: Light Polarization Sensitivity under Normal Incidence", *Physical Review Applied*, volume 10, 034022 (2018).
- S. Moraes, D. Navas, F. Béron, M P. Proenca, K.R. Pirota, C.T. Sousa, J.P. Araujo. "The Role of Cu Length on the Magnetic Behaviour of Fe/Cu Multi-Segmented Nanowires". *Nanomaterials* 2018, 8(7), 490 (2018) <https://doi.org/10.3390/nano8070490> (registering DOI).
- A. Pérez-Campos, M.A Sinusía Lozano, F.J.B. Garcia-Garcia, Z.C, Chen, G.F, Iriarte. "Synthesis of ScAlN thin films on Si (100) substrates at room temperature". *Microsystem Technologies*, volume 24, Issue 6, Pages 2711-2718, (2018)

- P.M. Ramos, N.C Karayiannis, M. Laso. "Off-lattice simulation algorithms for athermal chain molecules under extreme confinement". *Journal of Computational Physics*. Volume 375, 918-934 (2018)
- D.F. Reyes, V. Braza, A. Gonzalo, A.D Utrilla, J.M. Ulloa, T. Ben, D. González. "Modelling of the Sb and N distribution in type II GaAsSb/GaAsN superlattices for solar cell applications" *Applied Surface Science*. Volume 442, 1 June 2018, Pages 664-672 (2018)
- S. Ruiz-Gómez, M. Foerster, L. Aballe, M.P. Proenca, I. Lucas, J.L Pireto, A. Mascaraque, J. Figuera, A. Quesada, L. Perez. "Observation of a topologically protected state in a magnetic domain wall stabilized by a ferromagnetic chemical barrier". *Scientific Reports*, vol 8, Issue 1, Article number 16695 (2018)
- A. Sanz-Marco, R. Sánchez-Tovar, M. Montes Bajo, RM. Fernández-Domene, J. García-Anton. "Cathodoluminescence characterization of ZnO/ZnS nanostructures anodized under hydrodynamic conditions". *Electrochimica Acta*, vol. 269, 553 (2018)
- M. Sinusía Lozano, Z. Chen, Oliver A. Williams, G F. Iriarte. "Temperature characteristics of SAW resonators on Temperature characteristics of SAW resonators on Sc_{0.26}Al_{0.74}N/polycrystalline diamond heterostructures". *Smart Materials and Structures* 27,7,075015(8pp) (2018), doi: <https://doi.org/10.1088/1361-665X/aabca4>.
- M. Sinusía Lozano, A. Pérez-Campos, M. Reusch, L. Kirste, Th. Fuchs, A. Zukauskaitė, Gf. Iriarte. "Piezoelectric characterization of Sc_{0.26}Al_{0.74}N layers on Si (001) substrates", *Materials Research Express* 5, 036407 (2018), doi: <https://doi.org/10.1088/2053-1591/aab232>
- J. Tamayo-Arriola, M. Montes Bajo, N. Le Biavan, D. Lefebvre, A. Kurtz, J. M. Ulloa, M. Hugues, J. M. Chauveau, A. Hierro. "Ga-doping of nonpolar m-plane ZnMgO with high Mg contents". *Journal of Alloys and Compounds*, volume 766, 436-441 (2018). doi: <https://doi.org/10.1016/j.jallcom.2018.06.298>
- J. Tamayo Arriola, A. Huerta-Barberà, M. Montes Bajo, E. Muñoz, V. Muñoz-Sanjosé, A. Hierro. "Rock-salt CdZnO as a transparent conductive oxide". *Appl. Phys. Lett.* 113, 222101 (2018); <https://doi.org/10.1063/1.5048771>
- M. Tassieri, J. Ramírez, N.C Karayiannis, S.K. Sukumaran, Y. Masubuchi. "I-Rheo GT: Transforming from Time to Frequency Domain without Artifacts". *Macromolecules*. Volume 51, Issue 14, Pages 5055-5068 (2018)
- T. Tomašević-Ilić, D. Jovanović, I. Popov, R. Fandan, J. Pedrós, M. Spasenović, R. Gajić, "Reducing sheet resistance of self-assembled transparent graphene films by defect patching and doping with UV/ozone treatment". *Applied Surface Science*. Volume 458, Pages 446-453 (2018)
- L. Tramarin, C.A. Barrios. "Design of an aluminum/polymer plasmonic 2d crystal for label-free optical biosensing". *Sensors (Switzerland)*. Volume 18, Issue 10, number 3335 (2018)
- J.L. Urraca, B. Cortés-Llanos, C. Aroca, P. De La Presa, L. Perez, M.C. Moreno-Bondi, "Magnetic Field-Induced Polymerization of Molecularly Imprinted Polymers". *Journal of Physical Chemistry*, vol. 122, Issue 18, Pages 10189-10196 (2018)
- A.D. Utrilla, D.F. Grossi, D. F. Reyes, A. Gonzalo, V. Braza, T. Ben, D. González, A. Guzman, A. Hierro, P.M. Koenraad, J.M. Ulloa. "Size and shape tunability of self-assembled InAs/GaAs nanostructures through the capping rate". *Applied Surface Science*. Volume 444, 30 June 2018, Pages 260-266 (2018)
- A. Wang, L. Zeng, W. Wang, F. Calle. "Modification of strain and 2DEG density induced by wafer bending of AlGaIn/GaN heterostructure: Influence of edges caused by processing", *AIP Advances*. Volume 8, Issue 3, Article number 035318 (2018)

YEAR 2019

-C. Angulo Barrios. "Scotch Tape Optical Vapor Sensor for Ethanol-Methanol Mixtures", *Sensors*, AccessVolume 19, Issue 24, 5381, pp. 1 -9. MDPI (Multidisciplinary Digital Publishing Institute) (2019)

-M.G. Betti, M. Biasotti, A. Boscá, F. Calle, J. Carabe-Lopez, G. Cavoto, C. Chang, W. Chung, AG Cocco, AP Colijn, et al. "A design for an electromagnetic filter for precision energy measurements at the tritium endpoint. Progress in Particle and Nuclear Physics. Elsevier (2019), DOI: 10.1016/j.pnpnp.2019.02.004

-M.G. Betti, M. Biasotti, A. Boscá, F. Calle et al. "Neutrino physics with the PTOLEMY project: active neutrino properties and the light sterile case". *Journal of Cosmology and Astroparticle Physics* 07 (2019) 047; doi.org/10.1088/1475-7516/2019/07/047

-M.G.Betti, M.Biasotti, A. Boscá, F. Calle, J. Carabe-Lopez, G. Cavoto, C.Chang, W.Chung, A.G.Cocco, A.P.Colijn, J.Conrad, N.D'ambrosio, P.F.De Salas, M.Faverzani, A.Ferella, E.Ferri, P.Garcia-Abia, G. Garciagomez-Tejedor, S.Gariazzo, F.Gatti, C.Gentile, A.Giachero, J. E. Gudmundsson, Y.Hochberg, Y.Kahn, M.Lisanti, C.Mancini-Terracciano, G.Mangano, L.E.Marcucci, C.Mariani, J.Martínez, M.Messina, A. Molinero-Vela, E.Monticone, A.Nucciotti, F.Pandolfi, S.Pastor, J.Pedrós, C. Pérez De Los Heros, O.Pisanti, A.D.Polosa, A.Puiu, Y.Raitses, M.Rajteri, N.Rossi, R.Santorelli, K.Schaeffner, C.F.Strid, C.G.Tully, F.Zhao, K.M.Zurek

"A design for an electromagnetic filter for precision energy measurements at the tritium endpoint", *Progress in Particle and Nuclear Physics*, doi.org/10.1016/j.pnpnp.2019.02.004 (2019) doi.org/10.1016/j.pnpnp.2019.02.004

-R. Fandan, J. Pedros, F. Guinea, A. Boscá, F. Calle. "Effect of quasiparticle excitations and exchange-correlation in Coulomb drag in graphene". *Communications Physics* Volume 2, Issue 1, Article number 158 (2019)

-R. Fandan, J. Pedrós, F. Guinea, A. Boscá, F. Calle. "Coulomb Drag in Graphene: Effect of Quasiparticle Excitations". *Comm Phys.* 2, 158 (2019). <https://doi.org/10.1038/s42005-019-0259-9>

-A. Fernando-Saavedra, S. Albert, A. Bengoechea-Encabo, D. Lopez-Romero, M. Niehle, S. Metzner, G. Schmidt, F. Bertram, Ma. Sanchez-Garcia, A. Trampert, J. Christen, E. Calleja. "Ordered arrays of defect-free GaN nanocolumns with very narrow excitonic emission line width". *Journal of Crystal Growth*, volume 525, 125189 (2019)

-S. Fernández, A. Boscá, J. Pedrós, A. Inés, M. Fernández, I. Arnedo, J.P. González, M. De La Cruz, D. Sanz, A. Molinero, R.S. Fandan. M.A. Pampillón, F. Calle, Jj. Gandía, J. Cárabe, J. Martínez. "Advanced Graphene-Based Transparent Conductive Electrodes for Photovoltaic Applications". *Micromachines* 10, 402 (2019) doi: <https://www.mdpi.com/2072-666X/10/6/402/htm>

-S. Fernández, J.J. Gandía, A. Inés, I. Arnedo, A. Boscá, J. Pedrós, J. Martínez, F. Calle, J. Cárabe. "Transparent electrodes based on graphene". *Nanotechnol Adv Mater Sci*, Volume 2(3): 1–3, 2019

-A. Gonzalo, L. Stanojevic, Ad. Utrilla, Df. Reyes, V. Braza, D. Fuertes Marrón, T. Ben, D. Gonzalez, A. Hierro, A. Guzman, J.M. Ulloa. "Open circuit voltage recovery in GaAsSbN-based solar cells: Role of deep N-related radiative states". *Solar Energy Materials and Solar Cells*. Volume 200, Article number 109949 (2019)

-E. Hernandez-Martin, F. Calle, J.C. Dueñas, M. Holgado, A. Gomez-Perez. "Participation of women in doctorate, research, innovation, and management activities at Universidad Politécnica de Madrid: analysis of the decade 2006–2016". *Scientometrics* (2019) 120:1059–1089, <https://doi.org/10.1007/s11192-019-03179-9>

-A. Hierro. M. Montes Bajo, M. Ferraro. J. Tamayo-Arriola, N. Le Biavan, M. Hugues, Jm. Ulloa, M. Giudici, J-M Chauveau, P. Genevet. "Optical Phase Transition in Semiconductor Quantum Metamaterials". *Phys. Rev. Lett.* 123, 117401 (2019)

- J. Jiménez, Jm Manuel, P. Aseev, P.E.D Soto Rodríguez, R. Nötzel, Z. Gačević, E. Calleja, R. García, F.M Morales. "(S)TEM methods contributions to improve the fabrication of InGaN thin films on Si, and InN nanostructures on flat Si and rough InGaN". *Journal of Alloys and Compounds*, Volume 783, 30, 697-708 (2019)
- A. Jollivet, B. Hinkov, S. Pirotta, H. Hoang, S. Derelle, J. Jaeck, M. Tchernycheva, R. Colombelli, A. Bousseksou, M. Hugues, N. Le Biavan, J. Tamayo-Arriola, M. Montes Bajo, L. Rigutti, A. Hierro, G. Strasser, J-M Chauveau, F.H Julien. "Short infrared wavelength quantum cascade detectors based on m-plane ZnO/ZnMgO quantum Wells". *Applied Physics Letters* Volume 113, Issue 25, 17 December 2018, Article number 251104
- A. Ladrón-De-Guevara, A. Boscá, J. Pedrós, E. Climent-Pascual, A. De Andrés, F. Calle, J. Martínez. "Reduced graphene oxide/polyaniline electrochemical supercapacitors fabricated by laser". *Applied Surface Science*, Volume 467-468, 691-697 (2019). doi.org/10.1016/j.apsusc.2018.10.194
- Y. Li, V. V. Naletov, O. Klein, J. L. Prieto, M. Muñoz, V. Cros, P. Bortolotti, A. Anane, C. Serpico, G. De Loubens. "Nutation Spectroscopy of a Nanomagnet Driven into Deeply Nonlinear Ferromagnetic Resonance". *Phys. Rev. X*, 9, 041036 (2019).
- J. López-Sánchez, A. Serrano, A. Del Campo, M. Abuín, E. Salas-Colera, A. Muñoz-Noval, G. R. Castro, J. De La Figuera, J. F. Marco, P. Marín, N. Carmona, O. Rodríguez De La Fuente, "Self-assembly of iron oxide precursor micelles driven by magnetic stirring time in sol-gel coatings". *RSC Adv.*, 9, 17571-17580 (2019)
- J.M. Llorens, V. Lopes-Oliveira, V. Lopez-Richard, E.R.C. De Oliveira, L. Wewior, J.M. Ulloa, M.D., Teodoro, G.E. Marques, A. Garcia-Cristobal, G-Q, Hai, B. Alen. "Topology Driven g -Factor Tuning in Type-II Quantum Dots". *Physical Review Applied* Volume 11, Issue 4, Article number 044011 (2019)
- B. Meng, J. Tamayo-Arriola, N. Le Biavan, M. Montes, A. Torres-Pardo, M. Hugues, D. Lefebvre, A. Hierro, J-M Chauveau, J. Faist. "Observation of Intersubband Absorption in ZnO Coupled Quantum Wells". *Phys. Rev. Applied* 12, 054007 (2019)
- L. Nicolai, Z. Gacevic, E. Calleja, A. Trampert. "Electron Tomography Of Pencil-Shaped Gan/ (In, Ga) N Core-Shell Nanowires". *Nanoscale Research Letters*. Volume 14, Issue 1, Article number 232 (2019)
- J. Orellana, T. Palacios, F. Calle, J.Y. Pastor. "Bio-inspired redesign of a hip prosthesis stem for improving geometrical optimization time". *Procedia Manufacturing* 41 (2019) 121-128.
- M. Perez-Jimenez, B. Bordel Sanchez, A. Migliorini, R. Alcarria. "Protecting Private Communications in Cyber-Physical Systems through Physical Unclonable Functions". *Electronics* 2019, 8, 390; doi:10.3390/electronics8040390.
- M. P. Proenca, M. Muñoz, I. Villaverde, A. Migliorini, V. Raposo, L. Lopez-Diaz, E. Martinez, J. L. Prieto. "Deterministic and time resolved thermo-magnetic switching in a nickel nanowire". *Scientific Reports*, (2019) 9:17339 | DOI:10.1038/s41598-019-54043-y
- M. P. Proenca, F. F. Oliveira, J. Cardoso, J. Ventura. "ZnO nanostructures for energy harvesting applications, in ZnO Thin Films: Properties, Performance and Applications". Ed. Paolo Mele, Nova Science Publishers, Inc., USA (2019) Capítulo 4. BOOK CHAPTER
- P. Rajak, M. Islam, Jj. Jimenez, Jm. Manuel, P. Aseev, Z. Gacevic, E. Calleja, R. Garcia, F.M. Morales, S. Bhattacharyya. "Unravelling the polarity of InN quantum dots using a modified approach of negative-spherical-aberration imaging". *Nanoscale* Volume 11, Issue 28, 9, Pages 13632-13638 (2019)
- V. Rollano, A Gomez, A Muñoz-Noval, J Del Valle, M Menghini, M C De Ory, J L Prieto, E Navarro, E M Gonzalez, J L Vicent. "Vortex dynamics controlled by local superconducting enhancement". *New Journal of Physics* 21,113059 (2019). <https://doi.org/10.1088/1367-2630/ab5994>

-N. Ruiz-Marín, V. Braza, A. Gonzalo, D. Fernández, T. Ben, S. Flores, JM. Ulloa, D. González. "Control of Nitrogen Inhomogeneities in Type-I and Type-II GaAsSbN Superlattices for Solar Cell Devices". *Nanomaterials* (Basel), 9(4): 623 (2019) doi: 10.3390/nano9040623

-N. Ruiz-Marín, D.F. Reyes, V. Braza, A. Gonzalo, T. Ben, S. Flores, A. Utrilla, Jm. Ulloa, D. González. "Nitrogen mapping from ADF imaging analysis in quaternary dilute nitride superlattices". *Applied Surface Science*, Volume 475, 473-478 (2019)

-M. Sinusía Lozano, Z. Chen, O.A. Williams, G. F. Iriarte. "Giant Reflection Coefficient on Sc_{0.26}Al_{0.74}N Polycrystalline Diamond SAW Resonators". *Phys. Status Solidi A*. (2019). doi: <https://doi.org/10.1002/pssa.201900360>

-J. Tamayo-Arriola, E. Martínez Castellano, M. Montes Bajo, A. Huerta-Barberá, E. Muñoz, V. Muñoz-Sanjose, A. Hierro. "Controllable and Highly Propagative Hybrid Surface Plasmon "Phonon Polariton in a CdZnO-Based Two-Interface System", *ACS Photonics*, 6 (11) 2816-2822, (2019), Link: <https://pubs.acs.org/doi/10.1021/acsphotonics.9b00912>

YEAR 2020

-C. Angulo Barrios. "An Analysis of a Compact Label-Free Guiding-Wave Biosensor Based on a Semiconductor-Clad Dielectric Strip Waveguide". *Sensors* (Basel, Switzerland) Open Access. 20, 12, 3368 (2020). <https://doi.org/10.3390/s20123368>

-C. Angulo Barrios. "Pressure sensitive adhesive tape: A versatile material platform for optical sensors" *Sensors* (Switzerland) Open Access. Vol. 20, 18, 5303, 1-17 (2020)

-P. Bartolomé, M. Maicas, R. Ranchal. "Out of plane component of the magnetization of sputtered Fe₇₂Ga₂₈ layers". *Journal of Magnetism and Magnetic Materials*. Vol 514, 167183 (2020)

-D. Castilla, R. Yanes, M. Sinusia, G. Fuentes, J. Grandal, M. Maicas, T. Álvarez-Arenas, M. Muñoz, L. Torres, L. López, J.L. Prieto. "Magnetization process of a ferromagnetic nanostrip under the influence of a surface acoustic wave" (Open Access). *Scientific Reports* Open Access. Vol 10, 1, 9413 (2020)

-R. Fandan, J. Pedros, A. Hernández-Mínguez, F. Iikawa, P.V. Santos, A. Boscá, F. Calle. "Dynamic Local Strain in Graphene Generated by Surface Acoustic Waves". *Nano Lett.* 2020, 20, 1, 402-409, <https://doi.org/10.1021/acs.nanolett.9b04085> (2020)

-S. Fernández, F. Naranjo, MA. Sánchez-García, E. Calleja. "111-nitrides resonant cavity photodetector devices". *Materials* Open Access. Vol. 13, 19, 4428, 1-12 (2020)

-S. Fernández-Ruano, J.P. González, J. Grandal, A.F. Braña, F. García, F. Borlaf, M.B. Gómez-Mancebo. "Non-treated low temperature indium tin oxide fabricated in oxygen-free environment to low-cost silicon-based solar technology". *Vacuum*, Vol 184, 109783 - 109783, Elsevier, (2020). <https://doi.org/10.1016/j.vacuum.2020.109783>.

-Y.K. Gaudy, Ž. Gacevic, S. Haussener. "Theoretical maximum photogeneration efficiency and performance characterization of In_xGa_{1-x}N/Si tandem water-splitting photoelectrodes editors-pick". *APL Materials* 8, 071111 (2020). <https://doi.org/10.1063/5.0007034>

-D. González, S. Flores, N. Ruiz-Marín, D.F Reyes, L. Stanojevic, A.D. Utrilla, A. Gonzalo, A. Gallego Carro, J.M. Ulloa, T. Ben. "Evaluation of different capping strategies in the InAs/GaAs QD system: Composition, size and QD density features". *Applied Surface Science*, Vol. 537, 148062 (2020)

-B. González-Bermúdez, B. González-Bermúdez, H.C. Kobayashi, A. Navarrete, C. Nyblad, Nyblad, M. González-Sánchez, M. De La Fuente, G. Fuentes, G.V. Guinea, C. García, G.R. Plaza. "Single-cell biophysical study reveals deformability and internal ordering relationship in T cells" *Soft Matter*, Vol 16, 24, 5669-5678 (2020)

- A. Gonzalo, A.D. Utrilla, U. Aeberhard, V.C. Braza, D.F. Reyes, D.F. Marrón, J.M. Llorens, B. Alen. "Diluted nitride type-11 superlattices: Overcoming the difficulties of bulk GaAsSbN in solar cells". *Solar Energy Materials and Solar Cells*, Vol 210, 110500 (2020)
- M. Herranz, M. Santiago, K. Foteinopoulou, N.C. Karayiannis, M. Laso. "Crystal, fivefold and glass formation in clusters of polymers interacting with the square well potential". *Polymers Open Access*. Vol 12, 5, 1111 (2020)
- T.K. Hsiao, A. Rubino, Y. Chung, K.S. Son, H. Hou, J. Pedros, A. Nasir, G. Ethier-Majcher, Mj Stanley, Rt. Phillips, T.A. Mitchell, J.P. Griffiths, I. Farrer, D. A Ritchie, Cjb, Ford. "Single-photon emission from single-electron transport in a SAW-driven lateral light-emitting diode". *Nature Communications Open Access Volume 11, Issue 1, Article number 917* (2020)
- S. Kumar, V. Pavelyev, P. Mishra, N. Tripathi, P. Sharma, F. Calle. "A review on 2D transition metal di-chalcogenides and metal oxidé nanostructures based NO₂ gas sensors", *Mat. Sci. Semicond. Process.* 107 (2020) 104865, <https://doi.org/10.1016/j.mssp.2019.104865>
- S. Kumar, V. Pavelyev, P. Mishra, N. Tripathi. "Thin film chemiresistive gas sensor on single-walled carbon nanotubes-functionalized with polyethylenimine (PEI) for NO₂ gas sensing". *Bulletin of Materials Science. Open Access*. Vol 43, 1, 61 (2020)
- M. Laso, N. Jimeno. "Representation Surfaces for Physical Properties of Materials". ISBN 978-3-030-40870-1, Springer-Verlag (2020)
- M. Laso, N. Jimeno. "Homogenization of Transport Properties of Composites based on Stochastic Dynamics". accepted in *Journal of Computational Physics* (2020)
- O. Parreño, P.M. Ramos, N.Ch. Karayiannis, M. Laso. "Self-Avoiding Random Walks as a Model to Study Athermal Linear Polymers under Extreme Plate Confinement". *Polymers* 12, 799 (2020); doi:10.3390/polym12040799
- J. L Prieto, M. Muñoz, V. Raposo, L. López-Díaz. E. Martínez. "Magnetic Nano-and Microwires. Capítulo 11: Joule Heating and its role in current-assisted domain Wall depinning in nanostrips". Editorial: Elsevier, editor: Manuel Vázquez. ISBN: 978-0-08-102832-2 (2020).
- M.P. Proenca, C. T. Sousa, J. Ventura, J. P. Araujo. "Cylindrical Magnetic Nanotubes: Synthesis, Magnetism and Applications". in *Magnetic Nano-and Microwires*, 2nd Edition, Ed. Manuel Vazquez, Woodhead Publishing, Elsevier, UK (2020) Capítulo 6.
- P.M. Ramos, M. Herranz, K. Foteinopoulou, N. Ch. Karayiannis, M. Laso. "Identification of Local Structure in 2-D and 3-D Atomic Systems through Crystallographic Analysis". *Crystals* 2020, 10(11), 1008 (2020), <https://doi.org/10.3390/cryst10111008>
- J. Rial, M. P. Proenca. "A Novel Design of a 3D Racetrack Memory Based on Functional Segments in Cylindrical Nanowire Arrays". *Nanomaterials* 2020, 10(12), 2403, (2020). <https://doi.org/10.3390/nano10122403>
- C. Rodrigues, M. Kumar, M.P. Proenca, J. Gutierrez, R. Melo, A. Pereira, J. Ventura. "Triboelectric energy harvesting in harsh conditions: Temperature and pressure effects in methane and crude oil environments". *Nano Energy*, volume 72, 104682 (2020). <https://doi.org/10.1016/j.nanoen.2020.104682>
- V. Rouco, R. Ei Hage, A. Sander, J. Grandal, K. Seurre, X. Palermo, J. Briatico, S. Collin, J. Trastoy, K. Bouzehouane, A. I. Buzdin, G. Singh, N. Bergeal, C. Feuillet-Palma, J. Lesueru. C. Leon, M. Varlea, J. Santamaria, Javier. E. Villegas. "Quasiparticle tunnel electroresistance in superconducting junctions". *Nature Communications*, volume 11, 658 (2020). <https://www.nature.com/articles/s41467-020-14379-w>
- N. Ruiz-Marin, D.F. Reyes, V. Braza, S. Flores, A. Gonzalo, J.M. Ulloa, T. Ben, D. González. "Formation mechanisms of agglomerations in high-density InAs/GaAs quantum dot multi-layer structures". *Applied Surface Science*, Volume 508, Article number 145218 (2020)

-N. Ruiz-Marín, D.F. Reyes, V. Braza, S. Flores, L. Stanojevic, A. Gonzalo, J.M. Ulloa, T. Ben, D. González. "Role of Sb on the vertical-alignment of type-11 strain-coupled InAs/GaAsSb multi quantum dots structures". Journal of Alloys and Compounds. Vol 832, 154914 (2020)

-M. Sawicka, N. Fiuczek, P. Wolny, A. Feduniewicz-Zmuda, M. Siekacz, M. Krysko, K. Nowakowski-Szkudlarek, J. Smalc-Koziorowska, S. Kret, Z. Gacevid, E. Calleja, C. Skierbiszewski. "Role of high nitrogen flux in InAlN growth by plasma-assisted molecular beam epitaxy". Journal of Crystal Growth. Vol 544, 125720 (2020)

-D. Tjeertes, T.J.F. Verstijnen, A. Gonzalo, J.M. Ulloa, M.S. Sharma, M. Felici, A. Polimeni, F. Biccari, M. Gurioli, G. Pettinari, C. Sahin, M.E. Flatté, P.M. Koenraad. "N-n H complexes in GaAs studied at the atomic scale by cross-sectional scanning tunneling microscopy". Physical Review B. Vol 102, 12, 125304 (2020)

-E. Velichko, E.K. Nepomnyashchaya, K.G. Gareev, J. Martínez, M. Maicas. "Characterization of magnetite-silica magnetic fluids by laser scattering". Applied Sciences. Vol 11, 1, 183, 1-14 (2020)

ANNEX D. Contributions to national and international meetings

D1. Contributions to national and international meetings

YEAR 2018

-F. Ajejas, P. Perna, D. Maccariello, J.L. Fernandez Cuñá, Do, A. Bollero, J.L. Prieto, M. Muñoz, J. Camarero, R. Miranda. "Universality of anisotropic magnetoresistance in spintronics systems". International Conference of Magnetism (ICM2018). San Francisco (USA), 2018

-S. Andres, P. Ramos, V. Sanz, K. Foteinopoulou, N. C. Karayiannis, M. Laso, M. Kroger

"Entanglements in Model Polymers: A Hierarchical Simulation Study". Polymers: Design, Function and Application, 21-23 March 2018. Barcelona (Spain), 2018

-J. Benito, P. Ramos, K. Foteinopoulou, N. C. Karayiannis, M. Laso. "Monte Carlo Simulations of Athermal Polymers Under Extreme Confinement". 12th Red Española de Supercomputación (RES) Users' Conference, 20 September 2018. Valencia (Spain), 2018

-F. Bertram, G. Schmidt, P. Veit, S. Petzold, S. Metzner, A. Fernando Saavedra, S. Albert, A. Bengoechea-Encabo, M.A Sanchez-Garcia, E. Calleja, J. Christen. "Nanoscale Imaging of Individual AlN/GaN/AlN Quantum Disk embedded in GaN Nanowires". International Workshop on Nitride Semiconductors (IWN 2018). Kanazawa (Japan), 2018

-A. Bosca, A. Ladron De Guevara, J. Pedros, J. Martinez, F. Calle. "Parameter space of graphene growth in cold-wall CVD reactors". 12th Spanish Conference on Electron Devices. Salamanca (Spain), 2018

-F. Calle, A. Bosca, J. Pedros, J. Martinez. "Acoustically-driven surface phonon-plasmon polaritons in graphene/h-BN and graphene/h-BN/graphene heterostructures on piezoelectric substrates". Deutsche Physikalischen Gesellschaft. Berlín (Germany), 2018

-D. Castilla, J.L. Prieto, M. Muñoz, M. Sinusia, G. Fuentes, L. Lopez-Diaz, R. Yanes. "Magnetization dynamics in Ni nanostripes induced by surface acoustic waves". International Conference of Magnetism (ICM2018). San Francisco (USA), 2018

-M. Evelt, V.E. Demidov, V. Bessonov, S. Demokritov, J.L. Prieto, M. Muñoz, J.B. Youssef, V. Naletov, G. De Loubens, O. Klein, M. Collet, K. Garcia-Hernandez, P. Bortolotti, V. Cros, A. Anane. "Amplification of spin waves in ultra-thin Yttrium Iron Garnet microwaveguides by the spin-orbit torque". International Conference of Magnetism (ICM2018). San Francisco (USA), 2018.

-R. Fandan, J. Pedros, A. Bosca, J. Martinez, F. Calle. "Engineering Light-Matter Interaction in Graphene by Surface Acoustic Waves". International Workshop on Sound-Enabled Nanotechnologies 2018. Valencia (Spain), 2018

-R. Fandan, J. Pedros, I. Aharonovich, A. Hernández-Minguez, J. Marcelo, J. Lopes, P.V. Santos. "Surface Acoustic Modulation of 2D materials Fernando Iikawa". International Workshop on Sound-Enabled Nanotechnologies 2018. Valencia (Spain), 2018

-R. Fandan, J. Pedros, A. Bosca, J. Martinez, F. Calle. "Engineering light-matter Interaction in Graphene by Surface acoustic waves". International Workshop on Sound-Enabled Nanotechnologies (IWSSENT 2018). Valencia (Spain), 2018

-R. Fandan, J. Pedros, J. Schiefele, A. Bosca, J. Martinez, F. Calle. "Acoustically-driven surface and hyperbolic plasmon-phonon polaritons in graphene/h-BN

heterostructures on piezoelectric substrates by Surface Acoustic Waves". Graphene Week. San Sebastián (Spain), 2018

-S. Fernandez, J. Carabe, D. Sanz, J.P. Gonzalez, J.J. Gandia, A. Molinero, J.M. Barcala, A. Bosca, J. Pedros, J. Martinez, F. Calle, M.B. Gomez-Mancebo, R. Fernandez-Martinez, I. Rucandio, A.J. Quejido. "Graphene for advanced transparent electrodes". ImagineNano. Bilbao (Spain), 2018

-A. Fernando-Saavedra, S. Albert, A. Bengoechea-Encabo, D. Lopez-Romero, M. Niehle, A. Trampert, M.A. Sanchez-Garcia, E. Calleja. "Selective area growth of GaN nanocolumns with extremely low photoluminescence linewidth of <0.6 meV". International Workshop on Nitride Semiconductors (IWN 2018). Kanazawa (Japan), 2018

-A. Gonzalo, A.D. Utrilla, U. Aeberhard, J.M. Llorens, B. Alén, D. Fuertes Marron, A. Guzman, A. Hierro, J.M. Ulloa. "Type-II GaAsSb/GaAsN superlattice solar cells". SPIE Photonics West 2018. San Francisco (EEUU), 2018

-A. Gonzalo, A.D. Utrilla, U. Aeberhard, J.M. Llorens, B. Alén, V. Braza, D.F. Reyes, D. González, D. Fuertes Marron, A. Hierro, J.M. Ulloa. "Strain-balanced type-II superlattices for efficient multi-junction solar cells". 7th World Conference on Photovoltaic Energy Conversion Waikiloa, Hawaii (EEUU), 2018

-A. Gonzalo, A. D. Utrilla, U. Aeberhard, J. M. Llorens, B. Alen, D. Fuertes Marron, A. Guzman, A. Hierro, J.M. Ulloa. "Type-II GaAsSb/GaAsN superlattice solar cells: Interplay between carrier lifetime, electronic coupling, and extraction efficiency". Proceedings Volume 10527, Physics, Simulation, and Photonic Engineering of Photovoltaic Devices VII;105270D. <https://doi.org/10.1117/12.2290079>. Spie Photonics West 2018. San Francisco (USA), 2018

-A. Gonzalo, A.D. Utrilla, U. Aeberhard, J.M. Llorens, B. Alen, V. Braza, D.F. Reyes, D. Gonzalez, D. Fuertes Marrón, A. Hierro, J.M. Ulloa. "Strain-blanced type-II superlattices for efficient multi-junction solar cells". World of Conference on Photovoltaic Energy Conversion (WCPEC-7). Hawai (USA), 2018

-A. Guzman, R. Gargallo-Caballero, R. San-Román, H. T. Grahn. "QWIP structures with lateral bias: An alternative approach to achieve high-temperature operation". Structure Infraed Photodetectors Conference (QSIP). Stockholm (Sweden), 2018

-A. Hierro, M. Montes Bajo, J. Tamayo-Arriola, J.M. Ulloa, D.F. Reyes, V. Braza, S. Flores, N. Ruiz, A.D. Utrilla, A. Gonzalo, T. Ben, J.M. Ulloa, D. González. "Effect of GaAs(Sb)(N) capping layers on (un)coupled In/GaAs multi quantum dot layers for enhanced solar cells". Advanced Nanomaterials Conference 2018. Aveiro (Portugal), 2018

-A. Hierro, M. Montes Bajo, J. Tamayo-Arriola, JM. Ulloa, N. Lebiavan, M. Hugues, J-M Chauveau. "Interfacial phonon resonances in ZnO/MgZnO quantum wells: a compositional calibration tool". International Workshop of ZnO. Varsovia (Poland), 2018

-A. Ladrón De Guevara, A. Bosca, J. Pedros, F. Calle, J. Martínez. "Laser-reduced graphene for energy storage devices". ImagineNano 2018 International Event – Nanospain 2018 Conference. Bilbao (Spain), 2018

-F. Iikawa, R. Fandan, J. Pedros, I. Aharonovich, A. Hernandez-Minguez, J. Marcelo, J. Lopes, P. V. Santos. "Surface acoustic modulation of 2D materials". International Workshop on Sound-Enabled Nanotechnologies (IWSSENT 2018). Valencia (Spain), 2018

-J. Martinez, Jp Gonzalez, D. Sanz Gonzalez, J. Morales Merino, S. Fernández, J. Carabe, A. Molinero, J.M. Barcala, Mb. Gomez, I. Rucandio. A. Bosca, J. Pedrós, A. Ladrón De Guevara, F. Calle. "Graphene Silicon-Heterojunction Solar Cells". Nanoportugal 2018. Lisboa (Portugal), 2018

-J. Martinez, M.B. Gómez-Mancebo, R. Fernández-Martínez, N. B. Goikoetxea, S. F. Carretero, A. Bosca, J. Pedros, F. Calle. S. Fernández, J. Cárabe, A. Molinero, J.M. Barcala, A. J. Quejido, I. Rucandio. "Thermally reduced graphene oxide for hydrogen storage". Nanoportugal 2018. Lisboa (Portugal), 2018

- A. Migliorini, B. Kuerbanjiang, D. Kepaptsoglou, M. Muñoz, J. Fernandez Cuñado, J. Camarero, C. Aroca, G. Yallejo-Fernandez, V. Lazarov, J.L. Prieto. "Exchange bias setting driven by a spontaneous crystallization of the antiferromagnetic Layer". International Conference of Magnetism (ICM2018). San Francisco (USA), 2018

-N. Nuñez, M. Vazquez, J. Tamayo-Arriola, V. Orlando, O. Albuquerque, A. Fernandez, C. Algora. "Influence of concentration and solar cell size on the warranty time of triple junction solar cells". 14th International Conference on Concentrator Photovoltaic Systems. AIP Conference Proceedings 2012, 060002 (2018) DOI 10.1063/1.5053526. Puerto Llano (Spain), 2018

-J. Pedros, J. Schiefele, A. Bosca, J. Martinez, F. Calle. "Light-Matter Interaction in Graphene/h-BN and Graphene/h-BN/Graphene Heterostructures Mediated by Surface Acoustic Waves". Graphene 2018. Dresden (Germany), 2018

-L. Pérez, J.L. Urraca, B. Cortes-Llanos, P. De La Presa, C. Aroca, M. More-No-Bondi. "Towards the synthesis of molecularly-imprinted-polymer coat-ed nanoparticles by magnetic field induced polymerization". International Conference of Magnetism (ICM2018). San Francisco (USA), 2018

-D.F. Reyes, V. Braza, S. Flores, N. Ruiz, A.D. Utrilla, A. Gonzalo, T. Ben, J.M. Ulloa, D. Gonzalez. "Effect of GaAs(Sb)(N) capping layers on (un)coupled InAs/GaAs multi quantum dot layers for enhanced solar cells". 11th Advanced Nanomaterials AMN2018. Aveiro (Portugal), 2018

-M. F. Romero, A. Bosca, J. Pedros, R. Fandan, J. Martinez, M. Á. Pampillon, T. Palacios, F. Calle. "Impermeable Graphene on AlGaIn/GaN HEMTs". 12th Spanish Conference on Electron Devices. Salamanca (Spain), 2018

-A. Rubino, T-K Hsiao, Y. Chung, S-K Son, H. Hou, A. Nasir, J. Pedros, R. T. Phillips, G. Éthier-Majcher, M. Stanley, M. Atatüre, K. Niang, G. Rughoobur, A. Flewitt, T. Mitchell, J. P. Griffiths, I. Farrer, D. A. Ritchie, C. J. B. Ford. "SAW-driven source of single photons: time-correlated single-photon measurements and photon-antibunching in a lateral undoped GaAs/AlGaAs n-i-p junction in the acoustic regime". International Workshop on Sound-Enabled Nanotechnologies 2018. Valencia (Spain), 2018

-N. Ruiz, D.F. Reyes, V. Braza, S. Flores, A. Gonzalo, A.D. Utrilla, J.M. Ulloa, T. Ben, D. González. "Nitrogen mapping from ADF analysis in GaAsSb(N) superlattices for high efficient solar cells". XV Congreso Nacional de Materiales. Salamanca (Spain), 2018

YEAR 2019

-A. Arlesiu, O. Baeza, J. De Frutos, V. Gonzalez, R. Kilian, B. Langlais, C. Lavin Garcia, R. Marante, J. Luis Mesa, C. Aroca, M. Maicas, M. Perez Jimenez, M. Ángel Rivero. "NEWTON novel instrument for susceptibility on site characterisation". EPSC-DPS Joint Meeting 2019. Geneva (Switzerland), 2019

-A. Bosca, A. Ladron-De-Guevara, J. Pedros, R. Fandan, M.A. Pampillon, J. Martinez, F. Calle. "Imaging techniques for characterizing the nucleation dynamics in CVD graphene". Graphene 2019. Rome (Italy), 2019

-V. Braza, D.F. Reyes, A. Gonzalo, N. Ruiz, S. Flores, Ad. Utrilla, T. Ben, Jm. Ulloa, D. Gonzalez. "Sb and N incorporation interplay in GaAsSbN/GaAs epilayers". Microscopy at the frontiers of science. Granada (Spain), 2019

-E. Calleja et al. "InAlN growth with high nitrogen-flux by plasma-assisted molecular-beam epitaxy". 20th EuroMBE 2019. Lenggries (Germany), 2019

-E. Calleja et al. "Ga(In)N nanowires grown by MBE: nanotransistors and quantum light emitters". 20th EuroMBE 2019. Lenggries (Germany), 2019

-E. Calleja et al. "MBE growth of ordered III-Nitride nanorods: basics and applications", PDI Topical Workshop on Epitaxial III-Nitride Semiconductor Nanowires. Berlin (Germany), 2019

-M. Diaz-Michelena, J.L Mesa, A. Arlensiu, J. De Frutos, V. Gonzalez, M. Perez Jimenez, C. Lavin Garcia, R. Marante, B. Langlais, R. Killan, O. Baeza, F. Rios, M.A Rivero, C. Aroca, M. Sanz, M. Maicas. "Newton novel magnetic instrument. Potential application to unveil key. Questions as the origin of martian moons". The Tenth Moscow Solar System Symposium 2019. Moscow (Russia), 2019

-S. Fernandez, J. J. Gandia, J. Carabe, J. P. Gonzalez, D. Sanz, A. Molinero, A. Bosca, J. Pedros, J. Martinez, F. Calle, M. B. Gomez-Mancebo, R. Fernandez-Martinez, I. Rucandio. "Challenges of CVD graphene integration into transparent electrodes for green energy solutions". Graphene Industry – Challenges & Opportunities (Graphin 2019). Madrid (Spain), 2019

-M. Ferraro, A. Hierro, Mm. Bajo, J. Tamayo-Arriola, N.L. Biavan, M. Hugues, Jm. Ulloa, M. Giudici, Jm. Chauveau, P. Genevet. "Intersubband plasmons induced negative refraction at mid-IR frequency in heterostructured semiconductor metamaterials". Conference on Lasers and Electro-Optics, CLEO 2019 - Proceedings May 2019, Article number 87501052019 Conference on Lasers and Electro-Optics, CLEO 2019. San Jose (USA), 2019

-S. Flores, V. Braza, Df. Reyes, L. Stanojevic, A. Gonzalo, N. Ruiz, T. Ben, Jm Ulloa, D. Gonzalez. "Comparative analyses of the In exchange in the InAs /GaAs QD system during the capping process with GaAs(Sb) at different growth rates". Microscopy at the frontiers of science Granada (Spain), 2019

-M.B. Gomez-Mancebo, R. Fernandez-Martinez, N. Brea, J. Martinez, A. Bosca, J. Pedros, F. Calle, S. Fernandez, J. Gandia, N. Gonzalez, J. Carabe, A. Molinero, J.M. Barcala, A.J. Quejido, I. Rucandio. "Evaluation of fast thermal synthesis of reduced graphene oxides". Graphene 2019 Rome (Italy), 2019

- M.B. Gomez-Mancebo, R. Fernandez-Martinez, A. Molinero, R. Fernandez-Saavedra, J. Carabe, J. Martinez, A. Bosca, J. Pedros, F. Calle, F. Leardini, J.F. Fernandez, G. Conte, A. Policicchio, S. Fernandez, N. Gonzalez, J.M. Barcala, A.J. Quejido, I. Rucandio. "Almacenamiento de Hidrógeno en nuevos materiales grafénicos". Congreso Iberoamericano de Hidrógeno y Pilas de Combustible 2019. Madrid (Spain), 2019

-M. B. Gomez-Mancebo, R. Fernandez-Martinez, J.J. Gandia, J. Carabe, S. Fernandez, A. Molinero, A. Bosca, J. Pedros, J. Martinez, F. Calle, F. Leardini, J.F. Fernandez, A.J. Quejido. "Optimizing the methodology for the production of reduced graphene oxides (rGO) by laser irradiation, chemical, thermal, and combined routes". GraphIn 2019. FUNDACION PHANTOMS Madrid (Spain), 2019

-M. Herranz, N.Ch. Karayiannis, M. Laso, M. Santiago. "Self-Assembly and Crystallization of Polymers Under Square Well Potential". RES Users' conference. Zaragoza (Spain), 2019

- A. Jollivet, F.H. Julien, B. Hinkov, S. Pirotta, S. Derelle, J. Jaeck, M. Tchernycheva, R. Colombelli, A. Bousseksou, M. Hugues, N. Le Biavan, J. Tamayo-Arriola, M. Montes Bajo, G. Strasser, J-M. Chauveau, A. Hierro. "Short infrared wavelength quantum cascade detectors based on m-plane ZnO/ZnMgO quantum Wells". Proc.SPIE 10919, Oxide-based Materials and Devices X, 1091919 (1 March 2019); doi: 10.1117/12.2507768. SPIE OPTO. - PHOTONICS WEST 2019. San Francisco (USA), 2019

-A. Hierro, M. Montes Bajo, J. Tamayo-Arriola, J.M Ulloa, N. Leviaban, M. Hugues, Jm. Chauveau. "Interface phonon-polaritons as an all-optical technique to

assess the Mg content in ZnO/MgZnO multiple quantum wells". SPIE OPTO. - PHOTONICS WEST 2019. San Francisco (USA), 2019

-E. Martínez Castellano, J. Tamayo-Arriola, M. Montes Bajo, A. Huerta-Barbera, E. Muñoz, V. Muñoz-Sanjose, A. Hierro. "Double-interface surface plasmon modes in CdZnO thin films and their hybridization with phonons". META 2019. The 10th International Conference on Metamaterials, Photonic Crystals and Plasmonics. Lisboa (Portugal), 2019

-J. Martínez, A. Ladrón De Guevara, A. Boscá, J. Pedrós, M. A. Pampillón, F. Calle "Reduced graphene oxide/polyaniline electrochemical supercapacitors fabricated by laser". Graphene 2019. Rome (Italy), 2019

-J. L. Mesa Uña, A. Arlensu Ordoñez Cencerrado, M. Diaz-Michelena, M. Perez Jimenez, C. Lavin Garcia, R. Marante, L. Gonzalez. "New magnetometric devices for planetary exploration"

2019 International Symposium on Electromagnetic Compatibility (EMC Europe 2019). Barcelona (Spain)

-M. Montes Bajo, J. Tamayo-Arriola, N. Le Biavan, J.M. Ulloa, P. Bennequies, D. Lefebvre, M. Hugues, J-M Chauveau, A. Hierro. "Intersubband absorption at normal incidence by m-plane ZnO/MgZnO quantum wells". Proceedings of SPIE - The International Society for Optical Engineering. Volume 10919, 2019, Article number 109192C. Oxide-Based Materials and Devices X 2019. San Francisco (USA) 2019

-S. Moraes, D. Navas, F. Beron, M. P. Proenca, K. R. Pirota, C. T. Sousa, J. P. Araujo. "Magnetic behaviour of Fe/Cu multisegmented nanowires: the influence of non-magnetic layer thickness". 10th International Symposium on Metal-lic Multilayers (MML2019), 17th - 21st June 2019. Madrid (SPAIN), 2019

-J. Orellana, T. Palacios, F. Calle, J.Y. Pastor. "Bio-inspired redesign of a hip prosthesis stem for improving geometrical optimization time". Manufacturing Engineering Soc Int Conf,

Madrid (Spain), 2019

-J. Orellana, T. Palacios, F. Calle, J.Y. Pastor. "Effect of graphene specific area on the mechanical properties of a PMMA bone cement". EUROMAT. Stockholm, 2019

-J. Orellana, M. Hempel, F. Calle, J. Kong, T. Palacios. "Defect assessment in graphene through water-soluble polymers". EUROMAT, Stockholm, 2019

-J. Luis Prieto Martin, D. Castilla Aragon, G. Fuentes Iriarte, M. Sinusia Lozano, M. Muñoz

"Magnetic Precession Induced by Surface Acoustic Waves in Magnetic Nanostripes". Magnetic Materials and Magnetism (MMM), 2019. Las Vegas (USA), 2019

-I. Rucandio, M. B. Gomez-Mancebo, R. Fernandez-Martinez, J. J. Gandia, J. Carabe, S. Fernandez, A. Molinero, A. Bosca, J. Pedros, J. Martinez, F. Calle, F. Leardini, J. F. Fernandez, A. J. Quejido. "Optimizing the methodology for the production of reduced graphene oxides (rGO) by laser irradiation, chemical, thermal and combined routes". Graphene Industry – Challenges & Opportunities (Graphin 2019). Madrid (Spain), 2019

-N. Ruiz-Marin, Df. Reyes, V. Braza, S. Flores, A. Gonzalo, Jm. Ulloa, T. Ben, D. Gonzalez

"Formation of agglomerations in high-density multilayer InAs/GaAs quantum dot structures: the role of Sb in the capping layer". Microscopy at the frontiers of science. Granada (Spain), 2019

-N. Ruiz-Marin, Df. Reyes, V. Braza, S. Flores, A. Gonzalo, Jm. Ulloa, A.D. Utrilla, T. Ben, D. Gonzalez. "Analysis of the N distribution in GaAs(Sb)(N) superlattices from ADF imaging". 21st International Conference on Microscopy of Semiconducting Materials (MSM-XXI). Cambridge (UK), 2019

-N. Ruiz-Marin, Df. Reyes, V. Braza, T. Ben, S. Flores, A. Gonzalo, L. Stanojevic, Jm. Ulloa, D. González. "Influence of GaAsSb capping layers on the vertical-alignment

in closely stacked InAs/GaAs multi quantum dots". Microscience Microscopy Congress 2019 (MMC2019). Manchester Centra (UK), 2019

-L. Stanojevic, A. Gonzalo, Ad. Utrilla, Df. Reyes, V. Braza, D. González, D. Fuertes Marrón, A. Hierro, JM. Ulloa. "Effect of capping rate on InAs/GaAs quantum dot solar cells".

Proceedings of SPIE - The International Society for Optical Engineering Volume 10913, 2019, Article number 1091312 Physics, Simulation, and Photonic Engineering of Photovoltaic Devices VIII 2019. San Francisco (USA), 2019

-L. Stanojevic, A. Gonzalo, Ad. Utrilla, Df. Reyes, V. Braza, D. González, D. Fuertes Marrón, A. Hierro, JM. Ulloa. "Improving the efficiency of InAs/GaAs quantum-dot solar cells by engineering the wetting layer". SPIE OPTO. - PHOTONICS WEST 2019. San Francisco (USA), 2019

-D. Tjeertes, A. Gonzalo, J.M. Ulloa, M.S. Sharma, M. Felici, F. Biccari, M. Gurioli, P.M. Koenraad. "Hydrogen Passivation of N: GaAs Studied by Cross-Sectional Scanning Tunneling Microscopy". 21st International Conference on Microscopy of Semiconducting Materials. Cambridge (UK), 2019

-J. Tamayo-Arriola, E. Martinez Castellano, A. Huerta-Barbera, M. Montes Bajo, E. Muñoz, V. Muñoz-Sanjose, A. Hierro. "Rock-salt CdZnO for IR plasmonics". META 2019. The 10th International Conference on Metamaterials, Photonic Crystals and Plasmonics. Lisboa (Portugal), 2019

YEAR 2020

-J-M Chauveau, N. Le Biavan, M. Hugues, M. Montes, J. Tamayo-Arriola, A. Jollivet, B. Hinkov, H. Thi Hoang, B. Meng, D. Lefebvre, M. Tchernycheva, F. H. Julien, G. Strasser, A. Hierro, J. Faist. "Zinc oxide for THz quantum-cascade devices". SPIE Photonics West. San Francisco (USA) 2020

-R. Fandan, J. Pedros, A. Hernandez-Minguez, F. Iikawa, P. V. Santos, A. Bosca, F. Calle

"Dynamic Local Strain in Graphene Generated by Surface Acoustic Waves". Graphene2020 International Online Conference. Grenoble (France), 2020.

-R. Guedas Garcia, J.L Prieto Martin, V. J. Raposo Funcia. "Influence of the substrate temperature on the build-up of Joule heating in ferromagnetic nanostrips". JEMS 2020 virtual conference Lisbon (Portugal), 2020

-M. Herranz, N.Ch. Karayiannis, K. Foteinopoulou, M. Laso. "Crystallization and Glass Transition of Polymers Interacting with the Square-Well Potential". NanoPT2020, Conference online. Lisbon (Portugal), 2020

-R. Izquierdo-Lopez, J. Pedros, R. Fandan, A. Bosca, F. Calle. "SAW-driven plasmons in graphene heterostructures for sensing ultrathin layers". Graphene2020 International Online Conference. Grenoble (France), 2020

-N. Le Biavan, B. Meng, M. Montes Bajo, J. Tamayo-Arriola, A. Torres-Pardo, D. Lefebvre, M. Hugues, A. Hierro, J. Faist, J-M Chauveau. "Electronic coupling in ZnO asymmetric quantum wells for intersubband cascade devices". SPIE Photonics West. San Francisco (USA), 2020. doi: 10.1117/12.2547478.

-E. Martínez Castellano, J. Amayo-Arriola, M. Montes Bajo, A. Huerta-Barbera, E. Muñoz, V. Muñoz-Sanjose, A. Hierro. "CdZnO/sapphire as a plasmonic metamaterial: Surface plasmon-phonon polariton hybridization". Proceedings of SPIE - The International Society for Optical Engineering. Vol 11281, 1128116. Oxide-based Materials and Devices XI 2020. doi: 10.1117/12.2547481. San Francisco (USA), 2020

-D. Martinez Fernández, M. Herranz, N.Ch. Karayiannis, K. Foteinopoulou, M. Laso. "Effect of chain stiffness on athermal polymer crystallization and jamming". Plenareno Material Science and Nanotechnology Conference 2020. Online. Istanbul (Turkey), 2020

-Bo Meng, B Hinkov, N. Le Biavan, H. Hoang, D. Lefebvre, M. Hughes, D. Stark, M. Franckić, A. Torres-Pardo, J. Tamayo-Arriola, M. Montes Bajo, A. Hierro, G. Strasser, J. Faist, J-M Chaveau, "Terahertz intersubband electroluminescence from m-plane ZnO quantum cascade structures", 45th International Conference on Infrared, Millimeter and Terahertz Waves (IRMMW-THz 2020) (virtual), Buffalo, NY, (USA), 2020

-R. Izquierdo-Lopez, J. Pedros, R. Fandan, A. Bosca, F. Calle. "SAW-driven plasmons in graphene heterostructures for sensing ultrathin layers". Graphene2020 International Online Conference (2020)

- M. P. Proenca, M Muñoz, I Villaverde, A Migliorini, V Raposo, L Lopez-Diaz, E Martinez, J L Prieto. "Deterministic and time resolved thermo-magnetic switching in a nickel nanowire, Joint European Magnetic Symposia (JEMS 2020) - Virtual Conference, Lisboa, Portugal (2020)

-J. Rial, M. P. Proenca. "A novel design of a racetrack memory based on functional segments". JEMS 2020 virtual conference. Lisbon (Portugal), 2020

- N. Ruiz Marín, D Fernández, S. Flores, T. Ben, L. Stanojevic, A. Gallego Carro, A. Gonzalo, J. M. Ulloa, D. González. "Influence of thin AIAs capping layers on the structural and compositional properties of InAs QDs", European Microscopy Congress 2020. Online (2020)

D2. Invited talks at national and international meetings

YEAR 2018

-J-M. Chauveau, N. Le Biavan, M. Hugues, M. Montes, A. Jollivet, B. Hinkov, Y. Cordier, F.H. Julien, A. Hierro, G. Strasser, J. Faist. "Homoepitaxy of non-polar ZnO/(Zn, Mg)O multi-quantum wells: from a precise growth control to the observation of intersubband transitions"

Spie Photonics West 2018. San Francisco (USA), 2018

-E. Calleja et al. "III-Nitride Nanostructures: some Basics and Applications". 47th Conference on the Physics of Semiconductors, "Jaszowiec 2018". Szczyrk (Poland), 2018

-E. Calleja et al. "III-Nitride Nanostructures grown by MBE: Basics and Applications". Compound Semiconductor Week 2018. Boston (USA), 2018

-E. Calleja et al. "MBE growth of ordered III-Nitride nano/microrods: basics and applications". EUROSOL-ULIS 2018. Granada (Spain), 2018

-E. Calleja et al. "III-Nitride Nanostructures: some Basics and Applications". Future Trends of Microelectronics, FTM-2018/NEREID Workshop 2018. Sardinia (Italy), 2018

-E. Calleja et al. "MBE growth of ordered III-Nitride nano/microrods: basics and applications to light sources and pseudosubstrates". Frontiers in Photonics Workshop, IEEE Photonics Conference (IPC). Reston, Washington (USA), 2018

-E. Calleja et al. "MBE growth of ordered III-Nitride nano/microrods: basics and applications". 20th International Conference on Molecular Beam Epitaxy (ICMBE-XX). Shanghai (China), 2018

-A. Hierro, M. Montes Bajo, J. Tamayo-Arriola, M. Hugues, J.M Ulloa, N Le Biavan, R. Peretti, F. Julien, J-M Chauveau. "Intersubband transitions and many body effects in ZnMgO/ZnO quantum wells". Spie Photonics West 2018. San Francisco (USA), 2018

-M. Montes Bajo, N. Le Biavan, J. Tamayo-Arriola, A. Torres-Pardo, J.M. Gonzalez-Calbet, J.M Ulloa, D. Lefebvre, M. Hugues, J-Michel Chauveau, A. Hierro. "Breakage of the polarization selection rules for intersubband transitions in ZnO/MgZnO quantum wells". Spie Photonics West 2018. San Francisco (USA), 2018

- J. Pedros, A. Ladron De Guevara, A. Bosca, J. Martinez, F. Calle. "Graphene-based composite supercapacitors for enhanced capabilities". Nanotechnology for Security and Defense (NanoSD 2018). Madrid (Spain), 2018

YEAR 2019

-F. Calle. "Nanoelectrónica per a la informació i comunicacions ". Jornadas Inteligencia Creativa. Diputación de Gerona. Gerona (Spain), 2019

-E. Calleja et al. "MBE growth of ordered III-Nitride nanorods: basics and applications" PDI Topical Workshop on Epitaxial III-Nitride Semiconductor Nanowires. Berlin (Germany), 2019

-A. Hierro, M. Montes Bajo, J. Tamayo-Arriola, J. M. Ulloa, N. Le Biavan, P. Vennegues, D. Lefebvre, M. Hugues, J.-M. Chauveau. "Using ZnO multiple quantum well metastructures for IR light polarization sensitive photodetection under normal incidence". SPIE Photonics West. San Francisco (USA) 2019

-JM. Chauveau, M. Montes Bajo, M. Ferraro, J. Tamayo-Arriola, N. Le Biavan, M. Hugues, J. M. Ulloa, M. Giudici, P. Genevet, A. Hierro. "Intersubband transitions in wide band gap semiconductor oxides: a tool to tune the hyperbolic response in metamaterials". Proceedings of SPIE - The International Society for Optical Engineering. Volume 10919, 2019, Article number 109192C. Oxide-Based Materials and Devices X 2019. San Francisco (USA) 2019

-F. H. Julien, A. Jollivet, B. Hinkov, S. Pirotta, S. Derelle, J. Jaeck, M. Tchernycheva, R. Colombelli, A. Bousseksou, M. Hughes, N. Le Bigan, A. Hierro, G. Strasser, J.M. Chauveau. "Short infrared wavelength quantum cascade detectors based on m-plane ZnO /ZnMgO quantum wells". SPIE Photonics West. San Francisco (USA) 2019

-J. Martinez et al. "Graphene for advanced solar cells". 2nd International Himalayan Conference on Advanced Engineering and ICT-Convergence (ICAEIC 2019). Katmandu (Nepal), 2019

-J. Martinez, S. Fernandez, J. Carabe, D. Sanz, J.P. Gonzalez, J.J. Gandia, A. Molinero, J.M. Barcala, A. Bosca, J. Pedros, F. Calle, M.B. Gomez-Mancebo, R. Fernandez-Martinez, I. Rucandio, A.J. Quejido. "Improved energy consumption of LEACH protocol through multi-hop in the cluster Seung". 2nd International Himalayan Conference on Advanced Engineering and ICT-Convergence (ICAEIC 2019). Katmandu (Nepal), 2019

-J. Martinez, A. Bosca, J. Pedros, R. Fandan, M.A. Pampillon M. F. Romero, S. Fernandez, Jj. Gandia, J. Carabe, J.P: Gonzalez, D. Sanz, A. Molinero, F. Calle. "Graphene Devices for Energy Applications". Advanced Engineering and ICT convergence. Jeju (South Korea), July 11-13, 2019

-M. Montes Bajo, J. Tamayo-Arriola, J. M. Ulloa, N. Lebiavan, M. Hugues, J. M. Chauveau, A. Hierro. "Interface phonon-polaritons as an all-optical technique to assess the Mg content in ZnO/MgZnO multiple quantum wells". SPIE Photonics West. San Francisco (USA) 2019

YEAR 2020

-A. Hierro, J. Tamayo-Arriola, E. Martínez Castellano, M. Montes Bajo, A. Huerta-Barberà, E. Muñoz, V. Muñoz-Sanjósé, "CdZnO/sapphire as a plasmonic metamaterial: surface plasmon-phonon polariton hybridation", SPIE Photonics West, San Francisco (USA), 2020

-S. Moraes, D. Navas, F. Beron, M. P. Proenca, S. Caspani, K. R. Pirola, C. T. Sousa, J. P. Araujo. "Tuning the magnetic behaviour of Fe/Cu electrodeposited nanowires with controllable Fe and Cu", Joint European Magnetic Symposia (JEMS 2020) - Virtual Conference, Lisboa (Portugal), 2020

ANNEX E. Patents issued by ISOM

Before 2018:

-Inventors: José Luis Prieto Martín, Claudio Aroca, Andrés Ruiz, Luis Borrel, Manuel Fernández, Javier Gamo, Paloma Varela.

Title: "Etiqueta ópticamente variable basada en columnas magnéticas"

Number of Request: P201030960

Country: Spain-España

Date of priority: 2010-

Titularity: Universidad Politécnica de Madrid (UPM)

Country of Priority: Spain-España

-Inventors (p.o. de firma): Álvaro Navarro Tobar

Título: "Método y sistema de medida del tiempo de vida de fluorescencia en el dominio de la frecuencia con altos niveles de señal de fondo"

Number of Request: ES2342451

Date of priority: 2011-

Titularity: University Politécnica de Madrid

Country of Priority: Spain

-Inventors (p.o. de firma): Thomas Maike, Bruno Johannes Ehrensperger, Alessandra Massa, Manuel Laso, Birgit Wirtz

Título: "Laminate absorbent core for use absorbent articles"

Number of Request: 11169519 3- 1217

Date of priority: 2011-

Titularity: The Procter & Gamble Company

Country of Priority: European Union

-Inventors (p.o. de firma): Gonzalo Fuentes Iriarte

Título: "Método de fabricación de sustratos de circuitos integrados basados en tecnología CMOS"

Number of Request: ES2346396

Date of priority: 2011-

Titularity: University Politécnica de Madrid

Country of Priority: Spain

-Inventors (p.o. de firma): Martin Strassburg, Enrique Calleja-Pardo, Steven Albert, Ana María Bengoechea Encabo, Miguel Ángel Sánchez-García, Martin Mandi, Christopher Kölper

Título: "Light-emitting diode chip"

Number of Request: E2011, 0717 DE X /3265/2011E23319DE

Date of priority: 2012-

Titularity: University Politécnica de Madrid and others

Country of Priority: Spain

-Inventors (p.o. de firma): Fernando Calle, Alberto Boscá, Jorge Pedrós, Javier Martínez Rodrigo, Tomás Palacios Gutiérrez

Título: "Procedimiento de transferencia de nanocapas y aparato de realización del mismo"

Number of Request: P201331701

Date of priority: 2013-

Titularity: University Politécnica de Madrid y MIT

Country of Priority: Spain

-Inventors (p.o. de firma): Carlos Angulo, Maria Cruz Moreno, Sergio Carrasco, Víctor Canalejas, Fernando Navarro

Título: "Método de obtención de una estructura de polímero de impronta molecular (MIP)"

Number of Request: P2013309477

Date of priority: 2013-

Titularity: University Politécnica de Madrid and University Complutense de Madrid

Country of Priority: Spain

-Inventors: Claudio Aroca, Pedro Cobos, Ignacio De Mendizábal, Marina Pérez

Title: "Procedimiento de medida de parámetros magnéticos y de los armónicos temporales tanto en fase como en cuadratura del momento magnético de pequeñas muestras excitadas con campos magnéticos alternos o continuos y dispositivo para la puesta en práctica del procedimiento"

Number of Request: P201331745

Country: Spain-España

Date of priority: 2013-

Titularity: Universidad Politécnica de Madrid (UPM)

Country of Priority: Spain- España

-Inventors: Claudio Aroca, Pedro Cobos

Title: "Sistema antifraude para detectar la aplicación de campos magnéticos no deseados a dispositivos sensibles"

Number of Request: P201331641

Country: Spain-España

Date of priority: 2013-

Titularity: Universidad Politécnica de Madrid

Country of priority: Spain-España

-Inventors (p.o. de firma): Thomas Maike, Bruno Johannes Ehrensperger, Alessandra Massa, Manuel Laso, Birgit Wirtz, Roland Engel

Title: "Laminate absorbent core for use absorbent articles"

Number of Request: PTO/AIA/01 (06-12), Approved for use through 01/31/2014. OMB 06510032

Date of priority: 2014-

Titularity: The Procter & Gamble Company

Country of Priority: USA

-Inventors (p.o. de firma): Antonio Páez Dueñas, Jesús García San Luis, José Manuel Amarilla Álvarez, Beatriz Vázquez Santos, Rosa María Menéndez López, Ricardo Santamaría Ramírez, Clara Blanco Rodríguez, Fernando Calle Gómez.

Title: "Cathode for lithium batteries"

Number of Request: EP14382269.0 - 1359

Date of priority: 2014-

Titularity: REPSOL, S.A and University Politécnica de Madrid

Country of Priority: USA

-Inventors (p.o. de firma): Antonio Páez Dueñas, Jesús García San Luis, Patricia Álvarez Rodríguez, Marcos Granda, Clara Blanco Rodríguez, Ricardo Santamaría Ramírez, Patricia Blanco, Laura Fernández, Rosa María Menéndez López, Fernando Calle Gómez

Title: "Method for producing graphene with tunable properties by a multi-step thermal reduction process"

Number of Request: EP14382352.4 - 1355

Date of priority: 2014-

Titularity: REPSOL, S.A and University Politécnica de Madrid

Country of Priority: Spain

-Inventors (p.o. de firma): Jorge Pedrós, Alberto Bosca, Javier Martínez, Fernando Calle, Sandra Ruiz-Gómez, Lucas Pérez, Violeta Barranco Antonio Páez Dueñas, Jesús García San Luis.

Title: "Hierarchical composite structures based on graphene foam or graphene-like foam"

Number of Request: 14382428.2 - 1351

Date of priority: 2014-

Titularity: REPSOL, S.A and University Politécnica de Madrid

Country of Priority: Spain

-Inventors: Claudio Aroca, Pedro Cobos, Marina Pérez, Jesús Martínez-Ruano

Title: "Sistema de detección e identificación de vehículos rodados"

Number of Request: P201331863

Country: Spain-España

Date of priority: 2015-

Titularity: Universidad Politécnica de Madrid (UPM)

Country of Priority: Spain-España

-Inventors: Borja Bordel, Tomás Enrique Robles, Marina Pérez Jiménez, Ramón

Pablo Alcarria, Diego Martín de Andrés

Title: "Sistema automático de control de existencias líquidas en recipientes"

Number of request: P201531356

Country: Spain-España

Date of priority: 2015-

Titularity: Universidad Politécnica de Madrid (UPM)

Country of Priority: Spain-España

-Inventors: Marina Díaz Michelena; Pedro Cobos, Claudio Aroca Hernández-Ros

Title: "Método de medida para un sensor saturable"

Number of request: P201331925

Country: Spain-España

Date: 2015-

Titularity: INTA - Instituto Nacional de Técnica Aeroespacial

Country of Priority: Spain-España

-Inventors: Marina Pérez Jiménez, Borja Bordel Sánchez, Ramón Pablo Alcarria

Garrido, Tomás Enrique Robles

Title: "Procedimiento y sistema de comunicaciones para sensores"

Number of request: P201630171

Country: Spain-España

Date: 2016-

Titularity: Universidad Politécnica de Madrid

Country of Priority: Spain-España

-Inventors (p.o. de firma): Antonio Páez Dueñas, Francisco José Alía Moreno-

Ruiz, Violeta Barranco, Esteban Climent, Alicia de Andrés, José María Rojo, Jorge

Pedros, Alberto Bosca, Javier Martínez, Fernando Calle

Title: "Direct process for fabrication of functionalised 3D graphene foams"

Number of Request: EP16382227.3

Date of priority: 2017-

Titularity: REPSOL, S.A and University Politécnica de Madrid

Country of Priority: Spain

Between 2018 and 2020:

-Inventors (p.o. de firma): E. Calleja et al.

Title: "Phosphor-free all InGaN White Light LEDs using Nanocolumns"

Number of Request: 111600026.8.- 2506321

Date of priority: 2019-

Titularity: OSRAM

Country of Priority: Germany

-Inventors (p.o. de firma): E. Calleja et al.

Title: "Process for manufacturing non-polar III-nitride materials, product obtained thereof and devices comprising said material"

Number of Request: EP19382929.8.

Date of priority: 2019-

Titularity: OSRAM

Country of Priority: Germany

-Inventors: Pedro Cobos Arribas, José Luis Pérez Fernández, Claudio Aroca, Marina Pérez Jiménez.

Title: "Sistema Inductivo de transmisión/recepción de datos mediante bloqueo de la generación de armónicos de un núcleo ferromagnético"

Number of request: P201731478/ USA 16/233,279 /

Country: Spain-USA

Date: 2020-

Titularity: Universidad Politécnica de Madrid

Country of Priority: Spain-USA

ANNEX F. PhD Thesis

Finished PhD theses during 2018-2020:

-Title: "Spontaneous exchange bias formation driven by a structural phase transition in the antiferromagnetic material"

Author: Andrea Migliorini

Director/s: José Luis Prieto Martín and Manuel Muñoz Sánchez

University: Universidad Politécnica de Madrid, E.T.S. Ing. de Telecomunicación, 2018

Grade: Sobresaliente "Cum Laude"

-Title: "Caracterización térmica de nanocintas ferromagnéticas en experimentos de transferencia de espín"

Author: Cristina López López

Director/s: Dr. José Luis Prieto Martín and Dr. Manuel Muñoz Sánchez

University: Universidad Politécnica de Madrid, E.T.S. Ing. de Telecomunicación, 2018

Grade: Sobresaliente "Cum Laude"

-Title: "Structures based on GaAs (Sb) (N) semiconductor alloys for high efficiency multi-junction solar cells"

Author: Alicia Gonzalo Martín

Director: Dr. José María Ulloa

University: University Politécnica de Madrid, E.T.S. Ingenieros de Telecomunicación, 2019

Grade: Sobresaliente "Cum Laude"

-Title: "Infrared intersubband detection and plasmonics with (Zn, Mg) O and (Cd, Zn) O compounds"

Author: Julen Tamayo-Arriola

Director: Dr. Adrián Hierro and Dr. Miguel Montes

University: University Politécnica de Madrid, E.T.S. Ingenieros de Telecomunicación, 2019

Grade: Sobresaliente "Cum Laude". International Doctorate

-Title: "Diseño y desarrollo de sistemas basados en dispositivos magnéticos para aplicaciones en espacio y defensa"

Author: Marina Pérez Jiménez

Director: Dr. Claudio Aroca

University: University Politécnica de Madrid, E.T.S. Ingenieros de Telecomunicación, 2019

Grade: Sobresaliente

-Title: "Interacción entre ondas acústicas y paredes de dominio magnético"

Author: David Castilla Aragón

Director/s: Dr. José Luis Prieto Martín and Dr. Manuel Muñoz Sánchez

University: Universidad Politécnica de Madrid, E.T.S. Ing. de Telecomunicación, 2020

Grade: Sobresaliente "Cum Laude"

-Title: "Quasiparticles in graphene and other 2D materials: modulation by a surface acoustic wave and contribution to Coulomb drag".

Author: Rajveer Singh Fandan

Director/s: Dr. Jorge Pedrós Ayala

University: Universidad Politécnica de Madrid, E.T.S. Ing. de Telecomunicación, 2020

Grade: Sobresaliente "Cum Laude"

-Title: "Surface acoustic wave (SAW) devices on ScAlN thin films".

Author: Miguel Sinusia Lozano

Director/s: Dr. Gonzalo Fuentes Iriarte

University: Universidad Politécnica de Madrid, E.T.S. Ing. de Telecomunicación, 2020
Grade: Sobresaliente "Cum Laude"

Ongoing PhD theses:

-Title: "Transparent conductive oxide plasmonics for the infrared".

Author: Eduardo Martínez

Director/s: Dr. Adrián Hierro

University: Universidad Politécnica de Madrid, E.T.S. Ing. de Telecomunicación, 202-

Grade: In progress

-Title: "SAW-driven plasmonic devices in graphene heterostructures".

Author: Raúl Izquierdo López

Director/s: Dr. Fernando Calle Gómez / Dr. Jorge Pedrós Ayala

University: Universidad Politécnica de Madrid, E.T.S. Ing. de Telecomunicación, 202-

Grade: In progress

-Title: "Nanomaterials for energy storage applications"

Author: Hana Bourahla

Director/s: Dr. Fernando Calle Gómez / Dr. Yu Kyoung Ryu

University: Universidad Politécnica de Madrid, E.T.S. Ing. de Telecomunicación, 202-

Grade: In progress

-Title: "Graphene for biosensing applications in extracellular environment"

Author: Chahinez Malkia

Director/s: Dr. Alberto Boscá Mojena / Dr. Fernando Calle Gómez

University: Universidad Politécnica de Madrid, E.T.S. Ing. de Telecomunicación, 202-

Grade: In progress

-Title: "Application of graphene structures for renewable energies"

Author: Andrés Velasco Santiago

Director/s: Dr. Fernando Calle Gómez / Dr. Javier Martínez Rodrigo

University: Universidad Politécnica de Madrid, E.T.S. Ing. de Telecomunicación, 202-

Grade: In progress

-Title: (pending confirmation)

Author: Assia Hamada

Director/s: Dr. Javier Martínez Rodrigo / Dr. Yu Kyoung Ryu

University: Universidad Politécnica de Madrid, E.T.S. Ing. de Telecomunicación, 202-

Grade: In progress

-Title: "Desarrollo de estructuras de Superred Tipo II Para Células Solares Multiunión"

Author: Alejandro Gallego Carro

Director/s: Dr. José María Ulloa Herrero

University: Universidad Politécnica de Madrid, E.T.S. Ing. de Telecomunicación, 202-

Grade: In progress

-Title: "Optoelectronics and plasmonics in graphene on AlScNA"

Author: Serine Guellati

Director/s: Dr. Jorge Pedrós Ayala

University: Universidad Politécnica de Madrid, E.T.S. Ing. de Telecomunicación, 202-

Grade: In progress

-Title: "Fabricación y caracterización de nanodispositivos magnéticos con aplicaciones en magnónica y sistemas de gran acoplo espín órbita"

Author: Rodrigo Guedas García

Director/s: Dr. José Luis Prieto Martín

University: Universidad Politécnica de Madrid, E.T.S. Ing. de Telecomunicación, 202-

Grade: In progress

-Title: "" pending confirmation

Author: Alejandro Rivelles García

Director/s: Dr. Marco Maicas Ramos/Dra. Mar Sanz Lluch

University: Universidad Politécnica de Madrid, E.T.S. Ing. de Telecomunicación, 202-

Grade: In progress

-Title: "Molecular Simulation of energy- and entropy-driven phase transition and self-organization in polymer-based systems"

Author: Miguel Herranz Feito

Director/s: Dr. Manuel Laso Carbajo/Dr. Nikolaos Karagiannis

University: Universidad Politécnica de Madrid, E.T.S. Ing. Industriales, 202-

Grade: In progress

-Title: "Molecular Simulation of Polymer Jamming and Crystallization"

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Grade: In progress

-Title: "Dense polymer packings under conditions of extreme confinement: a simulation study"

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Grade: In progress

-Title: "On-Lattice, Stochastic Simulations of Entropically-Driven Complex Systems"

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Grade: In progress

-Title: ""pending confirmation

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Grade: In progress

-Title: ""pending confirmation

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Grade: In progress

-Title: ""pending confirmation

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Grade: In progress

-Title: ""pending confirmation

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Grade: In progress