Centre of Physics of the University of Minho

Activity Report 2018

March 2019

Contents

1. Introduction

The Physics Centre of Minho University (CFUM) is a research unit with a multi-disciplinary scientific activity in the fields of Pure and Applied Physics and adjacent areas. CFUM was founded in 1994 and recognized by the Portuguese Foundation for Science and Technology (FCT) in 2003. Since 2015 CFUM is a part of the Centre of Physics of Minho and Porto Universities (CF-UM-UP), a joint research unit officially approved by the FCT. The part based in Porto is composed of theorists working within the strategic research line "Quantum Physics and Fields in High Energy and Condensed Matter Theory". The research at the CFUM itself is conducted along the following three Lines:

(i) Assessment and enhancing visual performance,

(ii) Physics of quantum materials and bionanostructures,

(iii) Functional and smart materials and surfaces for advanced applications.

In 2018, CFUM included 50 effective members (UM teaching staff meeting selection criteria of minimum scientific production and holders of contracts "Investigador FCT"), 14 collaborators with PhD (university teaching staff) and 20 Post-Docs supported by research fellowships. Also linked to the Centre have been some 57 PhD students, either affiliated to CFUM or based at other research centres but co-supervised by the CFUM effective members, and a number of research students without PhD (see Sections 2 and 3 for detailed information).

The research at CFUM is carried out in the fields of Condensed Matter and Materials Physics (both theoretical and experimental), Materials Fabrication and Applications, Optics, Advanced Computations, Biophysics, Optometry and Vision Sciences, with some 10-15% of theoretical research and modelling and the reminder representing experimental research and development activities. CFUM is strongly involved in interdisciplinary R&D activities and the team includes Physicists, Materials Scientists, Applied Mathematicians, and specialists in Optics (including that of human eye) and Optometry. There are currently 30 research laboratories located in two UM campi. Each laboratory has a responsible person among Centre's integrated members. Technical support is provided by the UMinho School of Sciences personnel (one electronics technician, one engineer supporting the labs devoted to thin film deposition, and five general technicians).

CFUM's managing bodies are: (i) Director, elected among the Full or Associate Professors of the Physics Department, every three years via direct election, (ii) Deputy Director (appointed by the Director), (iii) Executive Committee including Director, Deputy Director and Research Line Coordinators, (iv) Scientific Council composed by all effective members holding a PhD, and (v) Steering Committee, an advisory board constituted by internationally recognized scientists that help to evaluate and improve the Centre's activities (see Section 2 for detailed information).

1.2 Summary and brief analysis of scientific performance in 2018

The total number of articles published in 2018 considerably exceeds that of the previous years (155 against 105 in 2017 and 133 in 2016), also increased the number of publications per member with PhD and average impact factor of journals where the articles were published (Graphs 2 and 3 in Section 2). Moreover, in contrast with a couple of previous years, our analysis indicates that in 2018 every effective member of the Centre published at least one article in an ISI-registered journal and most published two or more (Graph 4). Also, the citation rate of Centre's scientific production increased and the global Hirsch index has raised above a symbolic figure of 100. As in the previous years, a few papers were published in 2018 in high impact journals, such as Science, Nature Protocols, Nano Letters, etc. It deserves

mentioning the publication of the first book containing a collection of articles dedicated to printed Li-ion batteries, edited by two Centre's members, and 4 international patent applications.

The number of PhD theses defended in 2018, corresponding to projects fulfilled at the Centre, remained stable (8 compared to 7 in 2017 and in 2016), and the total number of PhD students, including those performing their projects at the Centre of Physics and also external students (co-)supervised by CFUM researchers, also remained at the level above 50. Also, some 44 Master theses were completed in 2018, with more than half corresponding to the "profiling" Master courses in Physics, Physics Engineering, Biophysics and Bionanosystems, and Materials Engineering.

Beyond other possible reasons, the most evident causes of the generally increased scientific production of the Centre in 2018 are: (i) In 2017 the CFUM researchers resumed all their laboratory activities in the School of Sciences building in Gualtar, which had been interrupted by maintenance works for nearly one year; (ii) In 2016, the plurianual funding of the Centre by the FCT was reestablished after an almost two-years' interruption.

The year of 2018 was remarkable in terms of the number of new research projects funded by the FCT that were approved in the framework of the last Call and started in the second half of the year. The Centre is involved in 25 such projects, as either a principal institution or a partner. With topics ranging from the optical properties of novel two-dimensional materials and plasmonic sensors to bionanostructures such as magnetolipossomes and biomimetics, to new concepts for food packaging. This corresponds to a large increase of funding (almost most of it is still to come), with a big part allocated to contracts of Post-Doctorate researchers. Along with the reasonable basic (pluriannual) funding from the FCT that was kept at the level of 170 k€ in 2018 (and also announced for 2019), it implies a potential stability of the Centre in terms of running costs (where the main problem is the difficulty to timely execute the money rather than lack of funding) and contracting researchers and students. The FCT funding allowed us to invest a considerable amount of money into fellowships awarded, through several competitive calls, to the best graduate students. Most of them developed fairly good research projects, which yielded valuable scientific results and contributed to the Centre's visibility. Moreover, the Centre was able to provide 1-2 month (BCC-type) fellowships to senior invited scientists whose stay at the Centre has proved quite useful for our research and related activities.

According to Graph 9, FCT is the Centre's principal funding entity, while the role of other important sources such as the National Innovation Agency (ANI) and the European Commission (EC) has lowered. Even though there is an absolute decrease in the amount of funding received from these entities in 2018, in the case of ANI it is probably an apparent effect caused by delays in starting of some important projects where the Centre is involved, namely, the large-scale cooperation project between the University of Minho and Bosch ("Sensible Car") and the big project dedicated to functional surfaces ("On-Surf"). Yet, the Centre should increase efforts in attracting EC funds.

The importance of industry borne funding remains low, in spite of the clearly applied profile of many research projects performed at the Centre. In this respect, it looks optimistic the launch of some spin-off and start-up initiatives in 2018, dedicated to biomedical applications of the magnetolipossomes and to printed batteries. Two innovative initiatives, "TopoSEM" and "MAG4Biomed" were distinguished with the 1-st and 2-nd Prizes, respectively, in the Innovative Business Ideas Contest named SpinUM (https://www.tecminho.uminho.pt/shownews.php?id=1031). In particular, "TopoSEM" is related to the development of a scientific software for reconstructing the 3D profile of a surface from 2D Scanning Electron Microscopy images. This software also was awarded the Born from Knowledge prize from ANI (http://bfk.ani.pt/pt/bfk-ideas-2018/) and from the Workshop on Electron Microscopy at INL (http://electron-microscopy.inl.int/workshop-electron-microscopy-2018/#tab-d85ffaf6006d4ad19b9) prize. Both "TopoSEM" and "MAG4Biomed" are now registered as spin-off companies associated with CFUM and promoted by TecMinho.

Recognition and visibility of the Centre is witnessed by the large number of invited talks (47 in 2018) given by its members and, especially, by the considerably broadened participation in Editorial Boards of specialized journals. Centre's member Bernardo Almeida was elected President of the Portuguese Physics Society (North branch); Nuno Peres confirmed his status of the most cited Portuguese scientist based in Portugal, Filipe Vaz was recognized with the title of Doctor Honoris causa by the University of Brasov (Romania) for his research in Materials Science, and José

Manuel Meijome received the University Minho Scientific Merit award (corresponding to the year of 2017 but awarded in 2018). At the level of younger researchers and students, Margarida Fernandes, a Post-Doctorate researcher at CFUM was honored with the L'Oreal Portugal Medal of Honor for Women in Science. She received a grant to develop new materials that would enable regeneration of bone tissues. Also, a number of best presentation/poster awards at international conferences have been achieved (Section 5.3).

Centre's members were involved in the organisation of several international and national conferences and Workshops, mostly outside of the walls of the University of Minho; a remarkable exception is the 15-th International Congress of Optometry and Vision Sciences, traditionally held in the Gualtar campus in Braga and attracting over 500 participants. The traditional Physics Colloquia and more technical Physics Seminars have been more regular and generally attracted more audience in 2018

1.3 Brief SWOT analysis of the CFUM

Strengths

The strongest point of the CFUM remains its interdisciplinary character, with the Physics playing the core role in the research activities across disciplines. Among its members, beyond "pure" Physicists, there are researchers with backgrounds in Materials Science and Engineering, Optometry, Chemistry, Biology and Applied Mathematics. Centre's activities are a combination of theoretical and experimental research and technological development. Concentration of efforts, high competence, and international recognition in several specific areas allow to identify three main pillars of the sustainability of the CFUM in the recent years, which are:

(1) Theoretical research in low-dimensional, quantum-confinement and plasmonic materials;

(2) Research in new materials targeting technologies and applications within the "relatively low cost – reasonably good performance" paradigm (such as polymer-based materials for sensing, thin film and printable devices and batteries, etc.);

(3) Research in Optometry and Vision Science using state of the art optical equipment and modelling to address some of the major societal challenges involving ocular health and vision.

The partnership with the theoretical Physicists in Porto in the framework of the FCT research unit CF-UM-UP, and with the International Iberian Nanotechnology Laboratory (INL) where two groups integrate CFUM staff acting as INL associates strongly contribute to Centre's sustainability. Other strong national and international links (Universities of Lisbon, Porto, Aveiro, Singapore and Hong Kong, DTU in Denmark, ICFO in Barcelona, to mention some) also strongly contribute to the high-level research carried out at the CFUM. Even though the participation of the Centre in European Programs may look modest in terms of numbers and received funding, the involvement in the Graphene Flagship (Graphene Based Revolutions in ICT and Beyond, Core 2, continuing) and European Training Network on Nanostructured Polymers (TheLink, finished in 2018) is very important for the Centre's visibility and attraction of researchers from abroad. Thanks to these positive factors, the Centre is able to have a high scientific performance, especially with respect to the modest overall funding level. In addition, several CFUM members are PI or associate researchers in applications to recent calls at the European level, either to the Europea Research Council or European Comission funding schemes.

Several facts witness the recognition of the Centre at both national and international levels, such as the awards and nominations of its members described in the end of the previous section, and the presence of the University of Minho in the last QS World University Rankings by area, among the best 250 in Materials Science, and in the World University Rankings 2019 by subject Physical Sciences (not present in the previous years).

Weaknesses

Many of the Centre's research facilities face the ris, of obsolescence and possibilities of their upgrade are very limited. The last serious upgrade of the scientific park of the Centre took place in 2006 (Re-equipment Program 2004). Beyond the insufficient funds, with the "individual" projects and even the basic funding from the FCT being too small to purchase considerable pieces of equipment, the current money handling rules make it virtually impossible to renew the facilities whose lifetime considerably exceeds the project duration.

Somewhat paradoxical, another problem is a continuation of the Centre's strength related to its multidisciplinary research, the too broad range of topics. With the restructuring of the Centre's organisation into only three research lines implemented recently and efforts made the Executive Commission in order to focus the members' activities on the recognized research topics (that are Centre's "brands"), this weakness seems to be decreased but still it is visible, e.g. by the too broad list of journals where our articles are published. The overall number of PhD students looks good but it should be taken with a caution because many of them are shared with other research centres and approximately half of them are enrolled on PhD programs outside the School of Sciences (mostly at the School of Engineering) and pursue research projects that are sometimes only very remotely related to the main research areas of the CFUM.

Yet another problem of the Centre is the unequal research and publication activity of its effective members. This year the statistics improved in comparison with two previous years since every effective member with PhD published at least one paper in 2018. Still, the distribution of the members' publication rates remains quite uneven (see Graph 4 in Sec. 2). There are some objective reasons for this, such as lack of motivation related to the almost complete stagnation of academic career progress in the last years and almost no new staff recruitments (however, the situation seems to slightly improve in this respect in 2018), difficulties in obtaining funds because of very low approval rate of scientific proposals in the recent years (again, the situation improved in the last year but the results will be seen later), considerably increased bureaucracy involved in buying consumables, and ageing of the laboratory facilities of the Centre. The latter makes it difficult to perform competitive experimental work within the Centre and makes it hard for the Centre's researchers to play a leading role in large scale collaborative projects, e.g. in the framework of European Programs.

Opportunities

Opportunities to reinforce Centre's research performance that are seen now include:

(i) the enhanced and broadened collaboration with the INL that possesses up-to-date experimental and technological facilities, as well as its extension to the new area of Quantum Information and Quantum Technologies supported by the recently announced thematic PhD Program based at the INL, affine to the UMinho Master Course in Engineering Physics where the branch dedicated to the Physics of Information attracts fairly good students;

(ii) recruitments of a large number of researchers with PhD in the framework of FCT-funded projects approved in 2018 and other FCT Programs directly dedicated to the employment of highly qualified personnel;

(iii) large-scale national projects funded by the Innovation Agency (ANI), such as "On-Surf" and "Sensible Car" (this collaborative project between UMinho and Bosch involves some 12 CFUM staff members, 3 positions for PhD researchers and a number of research students to be hired, and a budget superior to the basic funding of the Centre by the FCT); these projects can strongly push the CFUM research in the fields of functional surfaces, light-matter interaction and optics, and also help upgrading some of the Centre's facilities;

(iv) Program named Scientific Park of North Portugal Universities that may ease the aforementioned problem of need for update of Centre's scientific facilities.

Participation in EC Projects and applications for ERC Grants are always seen as opportunity that requires extra efforts of the researchers and the Centre will support such initiatives by all available means. The expected increase in manpower,

items (ii) and (iii), is a favorable condition for a more aggressive activity in this direction. Thematic international calls in the areas of CFUM's competitiveness must be in focus of this activity.

Another positive factor that can be seen as an opportunity for the Centre is the increasing number of candidates to the UM courses in Physics (BSc and Master in Physics and Master in Engineering Physics), verified in the last years. Moreover, some of our present undergraduate and Master students are very good and if we are able to attract them to our post-graduate courses, it can enhance the CFUM performance even further.

Threats

Threats are connected with the underfunding and administrative difficultines in managing those funds attracted, mostly in what concerns the update and maintenance of the scientific facilities, also with long delays typical of the national funding entities and the slowness of the money handling within the University. The numerous restrictions, some of which are introduced by the FCT and some by the University, make it very hard to repair the existing scientific equipment when necessary and acquire spare parts even if there is funding allocated to it.

Another threat is that, with the overwhelming priority to "earn money" and lack of up-to-date research facilities for fundamental studies, the scientific activity may be biased towards solely applied research and development on topics only very remotely related to the main research areas of the CFUM. Imbalance between the applied and fundamental research is dangerous because the CFUM may lose its identity as a Centre of Physics.

Mikhail Vasilevskiy

2. Organisation

Members of the Centre

Effective Members with Ph.D	51
Post-Docs and Research Fellows with PhD	34
Ph. D Students	60

Management Entities

Director:
Mikhail Vasilevskiy

Deputy Director:
Luís Rebouta

Executive Committee Members:

1. Paulo Coutinho
2. José Meijome
3. Martin Andritschky

Members of the Scientific Council (effective CFUM members):

1- Anabela Gomes Rolo
2- António Baptista
3- António Macedo
4- António Queirós Pereira
5- Bernardo Gonçalves Almeida
6- Cacilda Moura
7- Carlos Tavares
8- Daniela Lopes Ferreira
9- Diego Martinez
10- Eduardo Pereira
11- Elisabete Maria dos Santos Castanheira Coutinho
12- Etelvina de Matos Gomes
13- Francisco José Machado de Macedo
14- Gaspar Machado
15- Gueorgui Vitalievitch Smirnov
16- João Manuel Maciel Linhares
17- João Pedro Santos Hall Agorreta Alpuim
18- Joaquim Carneiro
19- Jorge M. Martins Jorge
20- Jorge Figueiredo
21- José Filipe Vilela Vaz
22- José M. González Méijome
23- Luís Cunha
24- Luís Manuel Gomes Vieira

25- Luís Rebouta
26- Luís Silvino Alves Marques
27- Madalena Lira
28- Manuel Filipe Costa
29- Maria de Fátima Guimarães Cerqueira
30- Maria Elisabete da Cunha Dias Real Oliveira
31- Maria Jesus Gomes
32- Mário Pereira
33- Mário Rui da Cunha Pereira
34- Marlene Susana Dionísio Lúcio
35- Marta Maria Duarte Ramos
36- Martin Andritschky
37- Michael Scott Belsley
38- Mikhail Igorevich Vasilevskiy
39- Nuno Miguel Machado Reis Peres
40- Paulo José Gomes Coutinho
41- Paulo Fernandes
42- Ricardo Pedro Lopes Martins de Mendes Ribeiro
43- Rui Pereira
44- Sandra Carvalho
45- Sandra M. Braga Franco
46- Senentxu Mendez
47- Sérgio M. Cardoso Nascimento
48- Sofia Lopes
49- Stanislav Ferdov
50- Stephane Louis Clain
51- Vasco Teixeira

Colaborators with PhD – staff members

1- Ana Maria Pinho
2- António Mário Almeida
3- Jorge Mendes (Instituto Politecnico de Vila do Conde)
4- José Alberto Díaz Rey
5- José Carlos Viana Gomes
6- José Luis Ribeiro
7- Júlia Maria Simões Dias Barata de Tovar Ayres de Campos
8- Li-Jian Meng (ISEP)
9- Maria José Sampaio
10- Maria Teresa Pitta de Lacerda-Arôso
11- Mário Zamith
12- Teresa Maria Santos Ribeiro Viseu
13- Vasco Almeida (UBI)

Colaborators with PhD - Post-Docs

1- Ana Rita Oliveira Rodrigues – Fellowship in the framework of Strategic Project (100%)
2- Armando Ferreira –SFRH/BPD/102402/2014 (100%)
3- Carlos Costa –SFRH/BPD/112547/2015 (100%)

4- Catalina Mansilla Sanchez - SFRH/BPD/105068/2014 (100%)
5- Clarisse Ribeiro –- SFRH/BPD/90870/2012 (100%)
6- Cristiana Alves - ERA-SIINN/0004/2013 (100%)
7- Filipe Fernandes - SFRH/BPD/116334/2016 (100%)
8- Isabel Carvalho –- Project n° 006684 - Minho-BIO/04469 - PTDC/CTM-NAN/4242/2014 (50%)
9- Jaime Eduardo Vieira Silva Moutinho Santos Project Uminho/Bosch (UMINHO/BI/214/2016) (50%)
10- Joel Borges - SFRH/BPD/117010/2016 (85%)
11- José Pedro Basto da Silva (Post-Doc FCT: SFRH/BPD/92896/2013) (50%)
12- Margarida Fernandes - SFRH/BPD/121464/2016 (70%)
13- Miguel Ribeiro - SFRH/BPD/116351/2016 (100%)
14- Paulo Pedrosa - UMINHO/BPD/26/2017 (100%)
15- Pedro Costa –SFRH/BPD/110914/2015 (50%)
16- Pedro Libanio Martins–SFRH/BPD/96227/2013 (100%)
17- Sebastian Calderon Velasco – (UMINHO/BPD/11/2016) (100%)
18- Sergey Pyrlin – European project TheLink (UMINHO/BGCT/08/2016) (100%)
19- Vanessa Cardoso – SFRH/BPD/98109/2013 (30%)
20- Vitor Correia – SFRH/BPD/97739/2013 (50%)
21- Yuliy Bludov - European Project Graphene FPA – 649953 (UMINHO/BPD/20/2016) (100%)

PhD Students

Name	PhD Program	Completed/ongoing
Abbas M.k. AL-Rjoub	Map-Fis	Ongoing
Alshaarawi Salem	OCV	Ongoing
Ana Catarina Branco Lima	Materials Engineering	Ongoing
Ana Isabel Carvalho Amorim de Sousa	OCV	Ongoing
André Chaves	Sciences – branch Physics	Completed
Andreia Marina de Sousa Almeida	Biomedical Sciences	Ongoing
António Castro	Engeneering Phd Program	Ongoing
Balaji Sompalle	Map-Fis	Ongoing
Beatriz Dias Cardoso	Materials Engineering	Ongoing
Bogdan Postolnyi	Materials Engineering	Ongoing
Bruna Gonçalves	Sciences – branch Physics	Ongoing
Catarina Abreu	Health and Medical Sciences	Ongoing
Catarina Isabel da Silva Oliveira	Materials Engineering	Ongoing
Célia Ribeiro	Education Science	Ongoing
César Rui Bernardo	Map-Fis	Ongoing
Clara Maria dos Santos Pereira	Sciences – branch Biology	Ongoing
Cláudia de Jesus Ribeiro Lopes	Sciences – branch Physics	Completed
Danilo Pedrelli	Map-Fis	Ongoing
Diogo Cavaleiro	Engeneering Phd Program	Ongoing
Diogo Ramos	Engeneering Phd Program	Ongoing
Edgar Carneiro	Engeneering Phd Program	Ongoing
Eduardo Teixeira	Biomedicine	Ongoing
Filipe André Peixoto Oliveira	Map-Fis	Completed
Filipe da Costa Correia	Materials Engineering	Ongoing
George Luiz Machado Junior	Materials Engineering	Completed
Gonçalo Catarina	Map-Fis	Ongoing
Helena I. Ferreira Neves	OCV	Completed

Hugo Manuel Castro Gonçalves	Map-Fis	Ongoing
Hugo Salazar Map	Map-Fis	Ongoing
Ícaro Jael Mendonça Moura	Map-Fis	Ongoing
Iran Segundo	Civil Engineering	Ongoing
Isabel Lopes	AdvaMtech	Ongoing
Jivago Serrado Gomes Aguiar Nunes	Materials Engineering	Ongoing
João Faria	MIT-Portugal PhD Programme in Engineering	Ongoing
João Teixeira	Materials Engineering	Ongoing
Juliana Alice Ferreira Oliveira	Materials Engineering	Ongoing
Juliana Dias	Sciences – branch Physics	Completed
Juliana Filipa Gouveia Marques	Materials Engineering	Ongoing
Laura Hernández Moreno	OCV	Ongoing
Lina Rodríguez Cely	OCV	Ongoing
Luísa Fialho	Engeneering Phd Program	Ongoing
Manuela Carvalho Proença	Map-Fis	Ongoing
Marco Pires M. S. Rodrigues	Map-Fis	Ongoing
Marta Adriana Félix Forte	Sciences – branch Physics	Ongoing
Nelson Pereira	Materials Engineering	Ongoing
Nuno Miguel Teles Oliveira	Sciences – branch Physics	Ongoing
Pablo Andres General Toro	Art	Ongoing
Patrícia Daniela Cabral da Silva	Map-Fis	Ongoing
Pedro Lima	Sciences – branch Math	Ongoing
Pedro Martins	Sciences – branch Physics	Completed
Ramya Gummadi	Map-Fis	Ongoing
Rita Ferreira	MIT-Portugal PhD Programme in Engineering	Ongoing
Rute Juliana Ferreira Macedo de Araújo	OCV	Ongoing
Salmon Landi	Sciences – branch Physics	Ongoing
Serguey Roberto Cusato Junior	OCV	Ongoing
Simone Rodrigues	AdvaMtech	Ongoing
Sylvie de Oliveira Ribeiro	Materials Engineering	Ongoing
Teresa Almeida	Materials Engineering	Ongoing
Tiago Marinho	Materials Engineering	Ongoing
Veniero Lenzi	Sciences – branch Physics	Ongoing

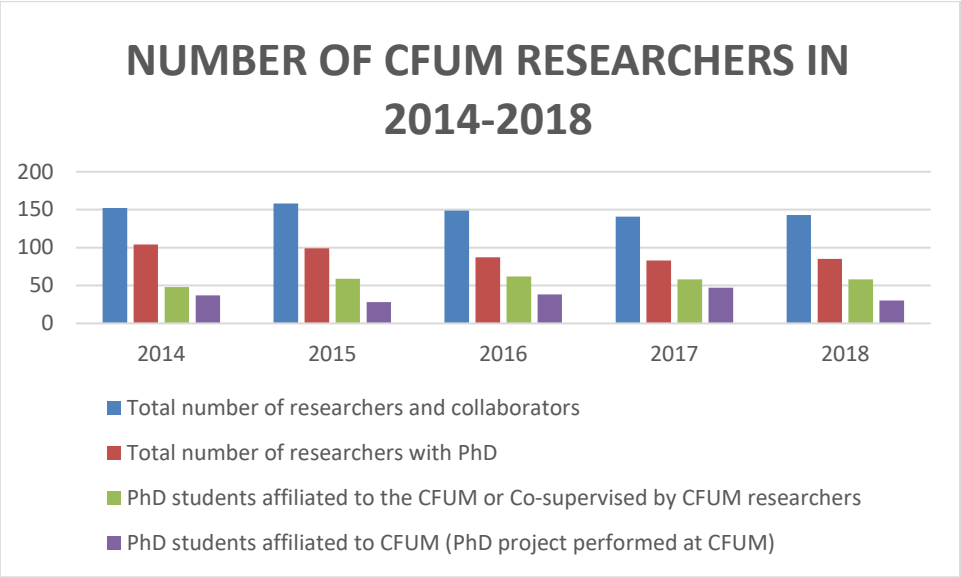
Advisory Board

- Prof. Sir Konstantin Novoselov, School of Physics & Astronomy, University of Manchester, Manchester, United Kingdom.

- Prof. Antti-Pekka Jauho, Department of Micro- and Nanotechnology, Technical University of Denmark, Denmark.

- Prof. Emeritus Denis Weaire, School of Physics, Trinity College, Dublin.

- Prof. Norberto López-Gil, Department of Physics, University of Murcia, Spain.



Graph 1: Number of CFUM researchers and collaborators in the last five years

3. Strategic Research Lines

Strategic Research Lines	Coordinator
Assessment and enhancing visual performance	José Meijome
Physics of quantum materials and bionanostructures	Paulo Coutinho
Functional and smart materials and surfaces for advanced applications	Martin Andritschky

4. Facilities and Infrastructure

4.1 Research Laboratories

Laboratory – location	Research Line	Responsable
Biophysics – Gualtar	Line 2	Paulo Coutinho
Ceramics Research – Azurém	Line 3	Mário Pereira
Computational Physics – Gualtar	Line 3	Luís Silvino Marques
Corrosion and electrochemical testings – Azurém	Line 3	Sandra Carvalho
Crystal Growth – Gualtar	Line 3	Etelvina de Matos Gomes
Doelectric Properties – Gualtar	Line 3	Bernardo Gonçalves Almeida

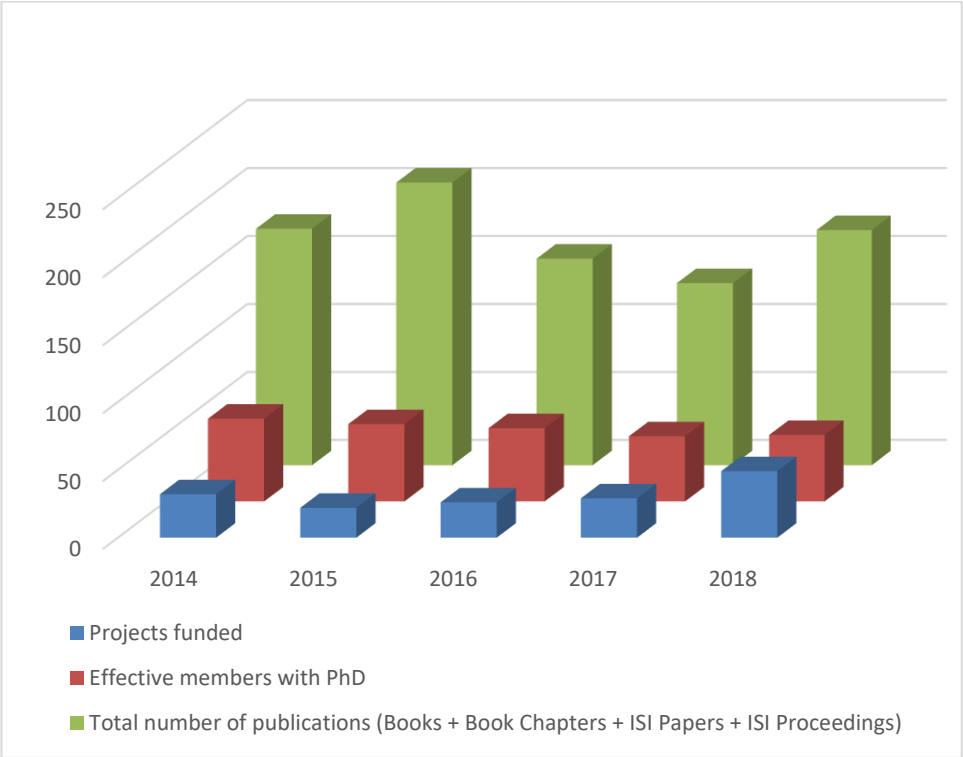
Electromechanical properties of materials – Azurém	Line 3	Senen Lanceros-Mendez
Femtosecond Laser Spectroscopy –Gualtar	Lina 2	Michael Belsley
Fluorescence Lifetime Measurements – Gualtar	Line 2	Mário Rui Pereira
Functional Coatings I – Azurém	Line 3	Martin Andritschky
Functional Coatings II – Azurém	Line 3	Luis Rebouta
Functional Coatings III – Azurém	Line 3	Filipe Vaz
Infrared Spectroscopy – Gualtar	Line 2	Luís Vieira
Magnetic and Electromechanical Properties – Gualtar	Line 2	Bernardo Gonçalves Almeida
Materials Processing – Azurém	Line 3	Stanislav Ferdov
Microtopography – Gualtar	Line 3	Manuel Filipe Costa
Visual Optics and Ophthalmic Instrumentation – Gualtar	Line 1	Sandra Maria Braga Franco
Optoelectronics – Azurem	Line 3	Carlos Tavares
Photoconductivity – Gualtar	Line 2	Fátima Cerqueira
Photophysics I – Gualtar	Line 2	Elisabete Coutinho
Photophysics II – Gualtar	Line 2	Elisabete Coutinho
Preparation – Azurém	Line 3	Sandra Carvalho
Preparation I – Gualtar	Line 2	Elisabete Coutinho
Preparation II – Gualtar	Line 3	Maria de Jesus Gomes
Raman Spectroscopy and Photothermal Measurements – Gualtar	Line 3	Cacilda Moura / Francisco Macedo*
Research in Clinical and Experimental Optometry – Gualtar	Line 1	Jorge Jorge/ José Manuel Meijome
Science of Vision and Colour – Gualtar	Line 1	João Linhares
Surface analysis – Azurem	Line 3	Filipe Vaz
Thin Films I – Gualtar	Line 3	Maria Jesus M. Gomes
Thin Films II – Gualtar	Line 3	Mário Pereira
Visual Rehabilitation – Gualtar	Line 1	António Baptista

***Since July 5th, Francisco Macedo is entirely in charge of this Laboratory.**

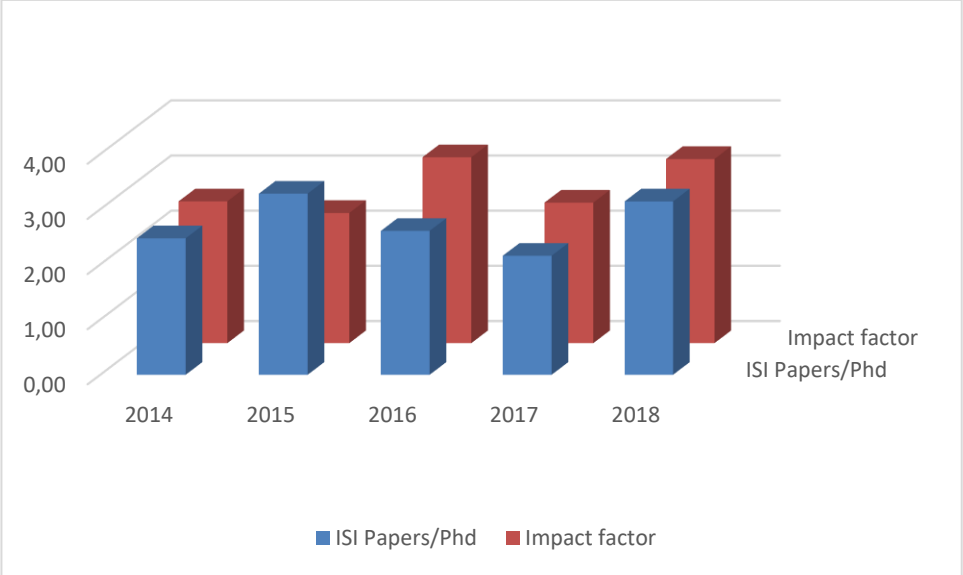
5. Indicators of the Centre Performance

5.1 Publications

Publications	**Number**
ISI papers (regular journal articles/ conference journal articles)	155/7
Books (Edited)	1
Book chapters	11
Patents (national /international)	1/4
Oral Presentations in Internationa Conferences (total/by invitation)	175/47

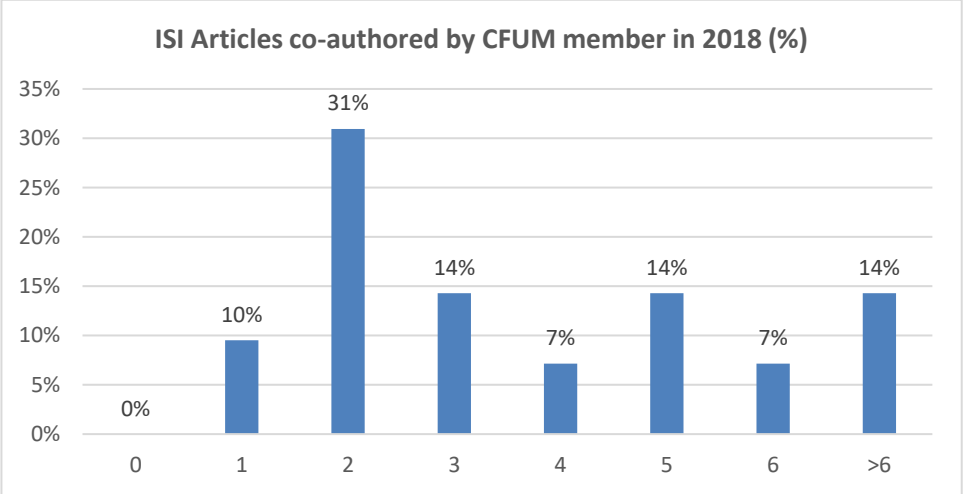


Graph 2: Scientific production, number of members, and number of funded projects

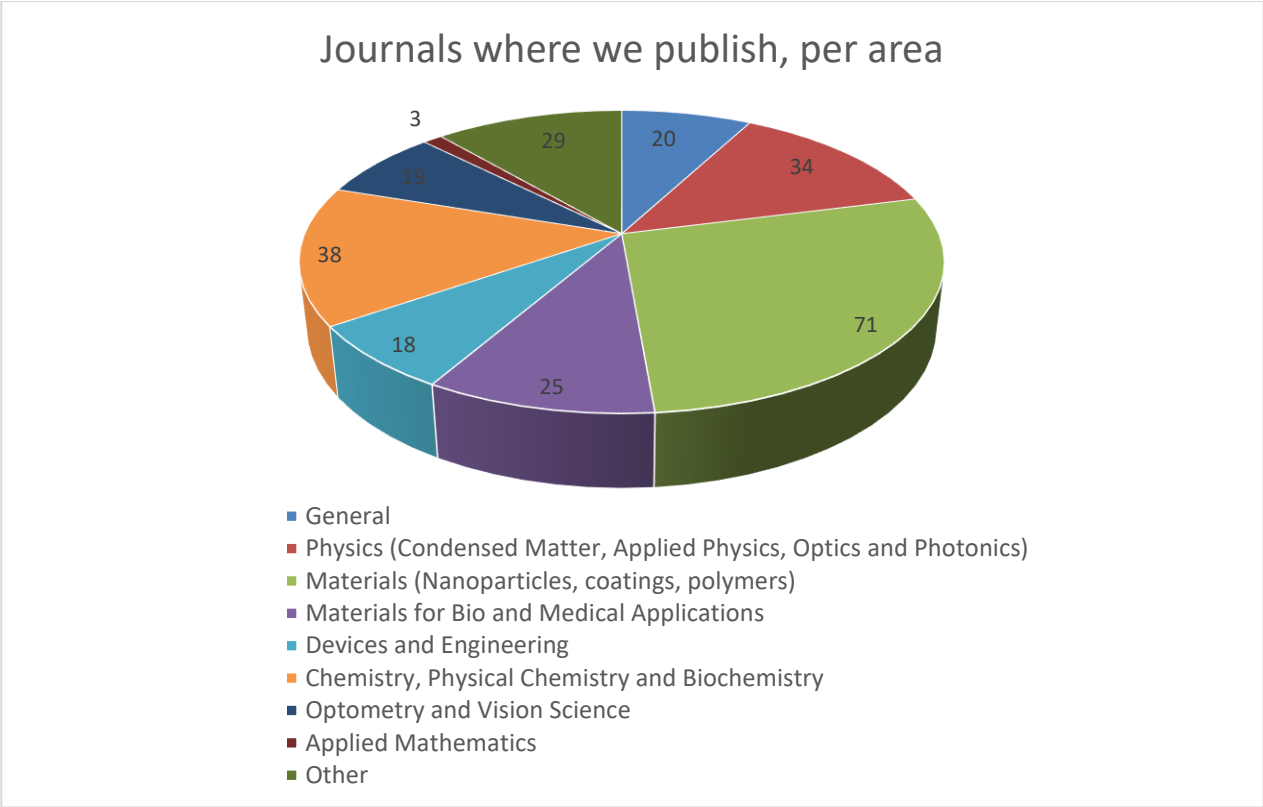


Graph 3: Number of journal articles published (per effective member with PhD) and average impact factor os journals where the articles were published

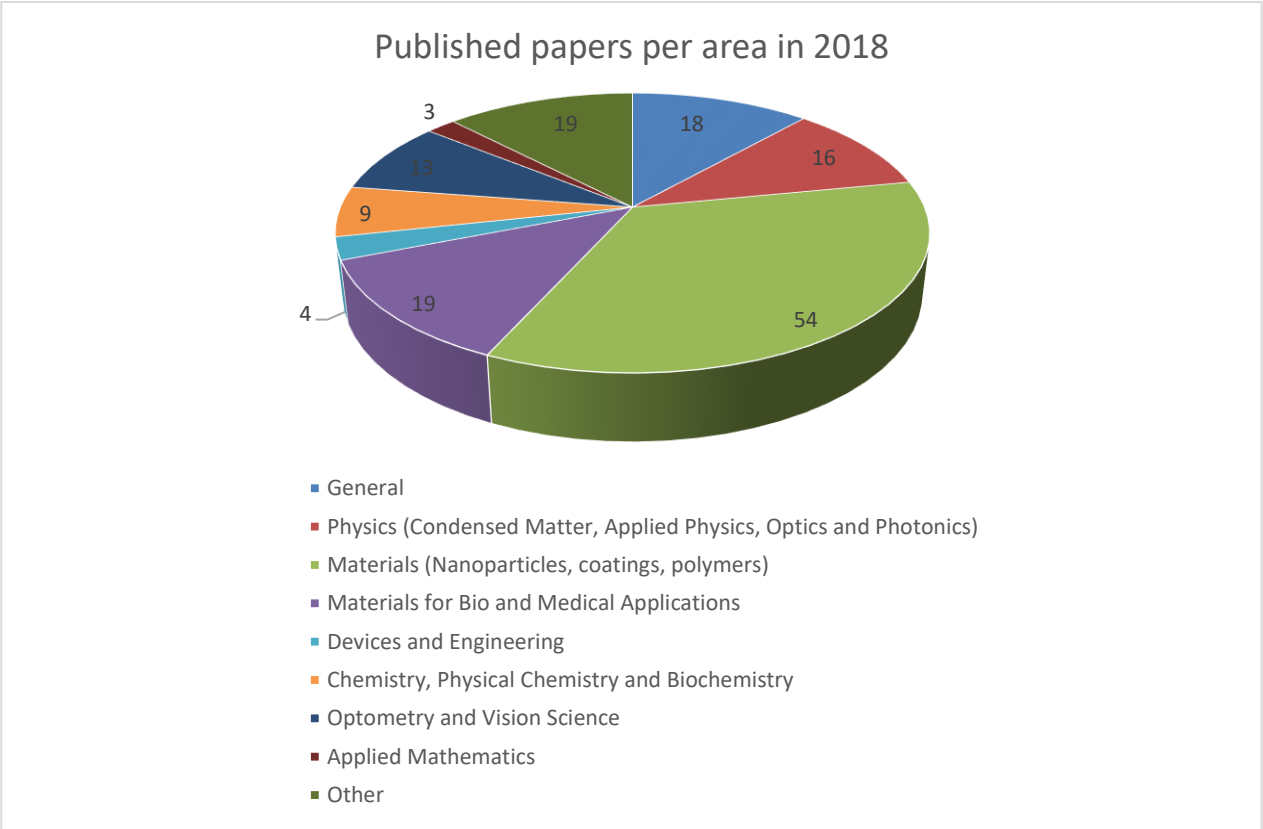
Box 1: Global data on Centre's publications and citations from ISI Web database
Sourse:
http://apps.webofknowledge.com/CitationReport.do?product=WOS&search_mode=CitationReport&SID=C4z42Rg29RbHLHY6Wqm&page=1&cr_pqid=1&viewType=summary



Graph 4: Number of ISI articles co-authored by a PhD member in 2018; statistical frequencies



Graph 5: Journals were CFUM published, per area



Graph 6: Published papers per area of investigation in 2018

5.2 Seminars, Colloquia, Workshops and Conferences organised by the Centre

Seminars

NNLO QCD predictions for inclusive jet production at the LHC
João Pires, Instituto Superior Técnico.
Tuesday, December 18th 2018 at 14:30h, Physics Amphitheatre, School of Sciences - Building 06 - Campus Gualtar

Models of visual processing and applications
Rafael Navarro, Professor de Investigação, Consejo Superior de Investigaciones Científicas. Universidad de Zaragoza, Espanha
Tuesday, November 20th 2018 at 14:30h, School of Sciences Amphitheatre - Building 06 - Campus Gualtar

Energy loss by fast-travelling charged particles traversing two-dimensional materials
Jaime Santos, Centro de Física da Universidade do Minho.
Friday, October 26th 2018 at 14:30h, Seminar room, Mathematic Department, School of Sciences - Building 06 - Campus Gualtar

Visual Optics: From Geometry-structure to Visual Response – Part I
Rafael Navarro, Professor de Investigação, Consejo Superior de Investigaciones Científicas. Universidad de Zaragoza, Espanha
Thursday, September 13th 2018 at 11:30h School of Sciences Amphitheatre - Building 06 - Campus Gualtar

Polymer-based magnetoelectric materials: From fundamental to applications
Pedro Libânio de Abreu Martins, Centro de Física da Universidade do Minho
Thursday, July 17th 2018 at 10:00h, Amphitheatre 12-1.03 (EC1.01) School of Sciences, Campus Azurém

Thin film barriers in Solid Oxygen Fuel Cells (SOFC) operating at high temperatures
Martin Andritschky, Centro de Física da Universidade do Minho
Thursday, 28th June 2018 at 10:00h, room 12-2.28 (EC2.13) School of Sciences, Campus Azurém

Resistive switching in ferroelectric based structures
José Pedro Basto da Silva, Centro de Física da Universidade do Minho
Wednesday, May 30th 2018 at 14:30h, Physics Amphitheatre School of Sciences - Building 06 - Campus Gualtar

Effective Methods for Advanced PCB Routing
Miguel Ferreira - LIP
Wednesday, May 2nd 2018 at 15h Physics Amphitheatre School of Sciences - Building 06 - Campus Gualtar

Electron-phonon interactions in quantum wire/quantum well Ge/Si and Si/Ge nanowires
Carlos Trallero-Giner Centro Latinoamericano de Física, Rio de Janeiro, Brasil and Facultad de Física, Universidad de La Habana, Cuba
Wednesday, April 11th 2018 at 15h Physics Amphitheatre School of Sciences - Building 06 - Campus Gualtar

Low friction and wear resistance thin films for high temperature applications
Filipe Fernandes, Centro de Física da Universidade do Minho
Wednesday April 4th 2018 at 14:30h Room EC 2.30 School of Sciences, Campus Azurém

Ferroelectric based devices for memory and energy applications
José Pedro Basto da Silva – Centro de Física UMinho
Tuesday, February 27th 2018 at 14h30min Amphitheatre EC1.01 – Campus Azurém

Uma breve introdução à teoria matemática de controlo
Gueorgui Smirnov e Sofia Lopes, CFUM– Centro De Física Da Universidade do Minho
February 23rd 2018 at 14:30h, Seminar Room, Mathematic Department - Building 06 -Campus Gualtar

Development Of Bioactive Surfaces For Bone Ingrowth On Dental Implants
Cristiana Alves – Centro de Física Da Universidade do Minho
30th January 2018 at 14h, Amphitheatre Ec1.01 – Campus Azurém

Colloquia

O Premio Nobel da Física 2018
Michael Belsley, Centro de Física, Universidade do Minho.
Thursday, December 13th 2018 at 16h, Physics Amphitheatre, School of Sciences - Building 06 - Campus Gualtar

O que é Spintrónica?
António T. Costa, Centro de Física da Universidade do Minho.
Wednsday, October 31st 2018 at 16h, Physics Amphitheatre School of Sciences - Building 06 - Campus Gualtar

How Computers and Virtual Science help to understand the Nanoworld
Manuel Melle-Franco, Departamento de Química, CICECO, Universidade de Aveiro,
Portugal.
Wednsday, October 10th 2018 at 14:30h Physics Amphitheatre School of Sciences - Building 06 - Campus Gualtar

Sistemas de armazenamento de energia: desafios e oportunidades no âmbito das baterias de ião-lítio
Carlos M. Costa, Centro de Física, Universidade do Minho, 4710-057 Braga, Portugal
Wednesday, June 27th 2018 at 14:30h, Physics Amphitheatre School of Sciences - Building 06 - Campus Gualtar

Enhanced-Fluorescence of a Dye on DNA-Assembled Gold Nano-Dimers
Pedro Miguel Neves Ribeiro Paulo, do IST, Universidade de Lisboa.
11th January 2018 at 15h, Physics Amphitheatre School of Sciences - Building 06 - Campus Gualtar

Scientific Conferences organized in the University of Minho by members of the Centre of Physics

- **International**

Madalena Lira – Chairperson 15-th International Congress of Optometry and Vision Sciences. Universidade do Minho; Braga , April 28-29, 2018;

J. Meijome – Chairperson 1st International Summer School VisSciUM2018. June 17-24th, University of Minho, 2018.

José Meijome – President of the Program Committee of Meeting of the European Academy of Optometry and Optics (EAOO), Verlika Gorika Univeristy, Pula (Croácia), 11-13 may 2018.

Sérgio Nascimento e João Linhares - Organização da II International Colour Vision Society (ICVS) Summer School on Colour, University of Oxford, Oxford (United Kingdom), 30th July to 3rd August 2018

Stephane Clain, Gaspar J. Machado, Jorge Figueiredo, Rui M. S. Pereira, M. T. Malheiro, Christophe Berthon, Frederic Coquel, Steven Diot, Michael Dumbser, Enrique Fernandez-Nieto, Thierry Gallout, Raphael Loubere, Carlos Pares, Elena Vazquez Cendon - Co-organizers of Shark FV 2018 - Sharing higher order advanced research know how on Finite Volume, Ofir, Portugal, May 21-25, 2018; https://shark-fv.eu/

Nuno M. R. Peres – Member of the "International Advisory Committee" of Conference Low Dimensional Materials: theory, modeling, experiment, Dubna, Rússia, 9 - 12 July 2018.

Nuno M. R. Peres – Member of the "Scientific Committee" of IBM-QuantaLab Quantum Computing School 2018, INL, Braga, Portugal, 23 - 24 October 2018.

Pedro Alpuim - Member of the organizing committee of the Workshop on Solar Fuel Production Based on Nanostructured Photoelectrodes and Catalysts, INL, Braga, Portugal, 29-30 Nov. 2018.

Carlos Tavares - The 3rd International Conference on New Photocatalytic Materials for Environment, Energy and Sustainability (NPM-3) & The 4th International Conference on Photocatalytic and Advanced Oxidation Technologies for the Treatment of Water, Air, Soil and Surfaces (PAOT-4), Almeida Garret Municipal Library, Porto, Portugal, July 10-13, 2018. Member of the international scientific committee. Session Chairman (Session 10: Photocatalytic Water Treatment –II).
(https://redoxtech.com/npm/scope/)

Carlos Tavares - 52nd International Congress on Microscopy and Microanalysis – INCOMAM18, University of Coimbra, Portugal, October 12-13 2018. Member of the scientific committee. Session Chairman. (http://www.spmicros.com/incomam18/)

Luis Silivino Marques - HERALD SUMMIT 2018, Hooking together European research in Atomic Layer Deposition, September 2018 in Braga, INL.

Manuel Filipe Pereira Cunha Martins Costa - 15th International Conference on Hands-on Science, Advancing Science. Improving Education, Barcelona, Spain, July 16-20, 2018.

Joaquim Alexandre Santos Almeida Oliveira Carneiro - 8ª feira de ciências "Hands-on Science"/ 4º Concurso "À Descoberta da Luz", 25 de Maio de 2018, Viana do Castelo, Portugal

Sandra Carvalho - Chair: Symposium on "Thin films / coatings tribology", SurfCoat Korea 2018, The International Conference on Surfaces, Coatings and Interfaces, Incheon, Korea, from the 28th to the 30th March, 2018

Sandra Carvalho - Membro do International Scientific Committee, CNMAT - Salamanca 2018, XIV Congreso Nacional de Materiales, Salamanca, Spain, July 2018.

Sandra Carvalho - Organizer: Symposium on "Surface Science and Engineering for advanced Applications", CNMAT 2018, XV Congreso Nacionale de Materiales, 1st Iberian Meeting on Materials Science, 4th to the 6th July 2018, Salamanca, Spain.

Sandra Carvalho – Member of International Scientific Committee, PSE2018 – 16th International Conference on Plasma Surface Engineering, Garmisch-Partenkirchen, Germany, September 2018

- National

13ª JORNADA TÉCNICO-CIENTÍFICA DE CONTACTOLOGIA (CONTACTUM2018) Universidade do Minho. Braga (Portugal), February 6st, 2018

Ricardo Mendes Ribeiro – Organizer of the seminar "Large Area 2D heterostructures for photodetectors", Braga, 30 January 2018.

Bernardo Almeida – Organizer of the workshop "Colóquio de Física Médica", with Department of Physics of UMinho, Braga, 23 May 2018.

Bernardo Almeida - Organizer of the workshop "Colóquio de Física Médica - Philips", with Department of Physics of UMinho and Medical Physics Division of Philips Company, Braga, 6 June 2018.

5.3 Awards, prizes, membership in editorial boards of international journals and other forms of recognition by the community

UMinho Scientific Merit award: José M. González Méijome.

L'Oréal Portugal Medals of Honor for Women in Science 2018: Margarida M Fernandes; Post Doc supervised by S. Lanceros-Mendez, C. Ribeiro and M. Gama

2nd Prize SpinUM 2018: Spin-off project "MAG4Biomed", Elisabete M. S. Castanheira Coutinho, Ana Rita O. Rodrigues, Beatriz D. Cardoso, Daniela S. M. Pereira, Daniela F. Gomes, University of Minho, Guimarães, March 2018.

Best Poster Award: "Lab-on-a-chip platform based on graphene field-effect transistors for DNA sensing", P. Alpuim, J. Rafaela Guerreiro, R. Campos, M. Martins, A. Ipatov, M. F. Cerqueira, J. Borme, NANO.IL.2018, October 9-11 2018, Jerusalem, Israel.

Best final project oral presentation award: "Nanoencapsulated curcumin as a potential therapy for age related neurodegenerative diseases", T.B. Soares, J.P. Capela, M. Elisabete C.D. Real Oliveira, A. Dias, M. L. Bastos, Félix Carvalho and M. Lúcio, Innovation in Pharmacy, Advances and Perspectives - 1st Global Congress of Pharmacy Faculties, September 24-28, 2018, Salamanca, Spain.

Database and information sharing online platform to bridge higher education institutions graduates and enterprises. The Erasmus+ Voyage international cooperation project, Manuel F. M. Costa, A. Mário Almeida, L. Cunha, S. Teixeira, C. Moura, Luisa Mengoni, 7th International Conference on Knowledge and Education Technology, ICKET2018, August 22-24, 2018, Edinburgh, UK (Best Presentation)

Magnetron Sputtering as a Tool for Producing Metallic and Bimetallic Multifunctional Nanoparticles, Sebastian Calderon, Isabel Carvalho, Albano Cavaleiro, Sandra Carvalho, Paulo Ferreira. PSE2018, September 17 - 21, 2018, in Garmisch-Partenkirchen, Germany (PSE Early Career Award 2018 – SILVER MEDAL)

Self-lubricant and multilayered coatings as a solution for machining operations, F. Fernandes, T. Polcar, S. Carvalho, A. Cavaleiro, PSE2018 – 16th International Conference on Plasma Surface Engineering, Garmisch-Partenkirchen, Germany, September 2018 (PSE Early Career Award 2018 – BRONZE MEDAL)

Ricardo Brito Pereira et al., 3rd place in the Startup-Nano contest (Best startups in the nanotechnology area) - Startup Braga and INL (International Iberian Nanotechnology Laboratory) - Project ActiveBioreactor

José Dias, "New Generation of Green Printed Lithium-Ion Batteries", prize of the Fraunhofer Portugal Challenge 2018 (11/2018)

Participation in Journal Editorial Boards

- José Manuel Meijome
Journal of Optometry - Editor-in-Chief
Biomedical Research International - Editorial Board
PlosONE - Academic Editor
Journal of Ophthalmology Editorial Board Member

- António Queirós
Journal of Ophthalmology - Editorial Board Member

- Sandra Franco
Optometry Reports Editorial Board Editorial Board Member

- Sérgio Nascimento
Journal of the Optical Society of America A - Editorial Board Member

- Antonio Filipe Macedo;
Scandinavian Journal of Optometry and Vision Sciences, Editor

- Jorge Jorge
Journal of Optometry – Editorial Board Member

- Nuno M. R. Peres:
Co-editor of journal Europhysics Letters (since April 2013).
Member of the Editorial panel of the journal Applied Sciences (since January 2018).

- Michael Belsley:
Editor of the journal Open Physics (De Gruyter Publisher).

- Bernardo Almeida, Elisabete M. S. Castanheira Coutinho, Paulo J. G. Coutinho:
Co-editors of Special Issue "Development of Magneto Nanoparticles for Biomedical and Environmental Applications" of the journal Materials (MDPI).

- Mikhail I. Vasilevskiy:
Guest Editor of Special Issue "Optical Properties of Novel Semiconductor Nanostructures" of the Journal of Applied Sciences (MDPI).

- Senen Lanceros Mendez
Editorial board: Materials (MDPI)
Editorial board: Frontiers in Bioengineering and Biotechnology
Editorial board: Heliyon, Elsevier
Editorial Board: International Journal of Molecular Sciences MDPI
Editorial Board: Polymer Cryustallization (Elsevier)

- Luis Silvino Marques:
Open Journal of Physics – Academic editor.

- Manuel Filipe Costa:
Óptica Pura y Aplicada, OPA - Editorial Board, International Adviser.

Advances in Laser Optics and Photonics. - Editorial Board Member

- Joaquim Carneiro

Coatings (ISSN: 2079-6412 – IF: 2.350) - Editorial Board Member
International Journal of Photoenergy (ISSN: 1110-662X – IF: 1.547) - Editorial Board Member
Current Smart Materials (ISSN: 2405-4658) - Editorial Board Member

- Sandra Carvalho

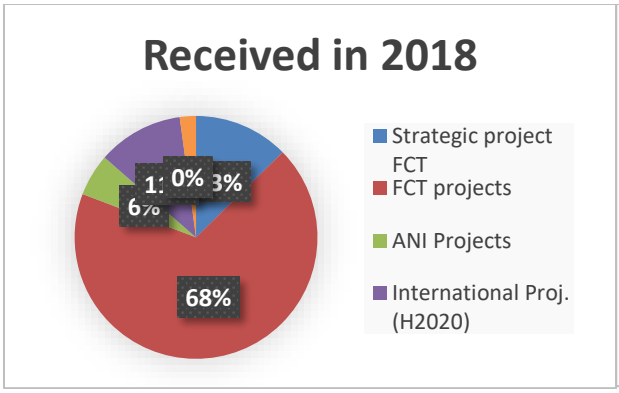
Biological Physics section of the Dataset Papers in Physics - Editorial Board member
Editorial Board of ISRN Nanomaterials.
Editorial Board Advances in Nanoscience and Nanotechnology

5.4 PhD and MSc degree leading projects at the Centre

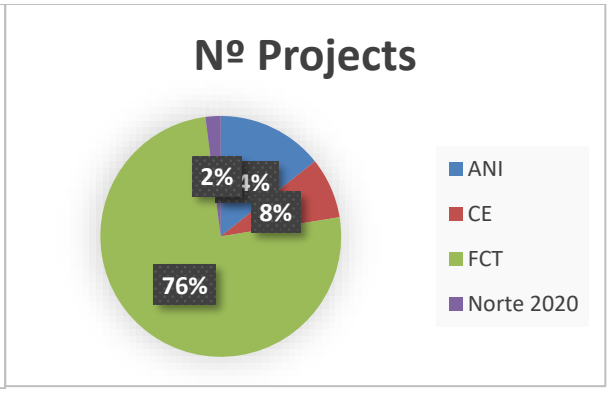
MASTER THESES	COMPLETED	44
PH.D. THESES (PERFORMED AT CFUM / (CO-) SUPERVISED BY A CFUM MEMBER)	ONGOING	37/16
	COMPLETED	6/1

5.5 Funding Summary

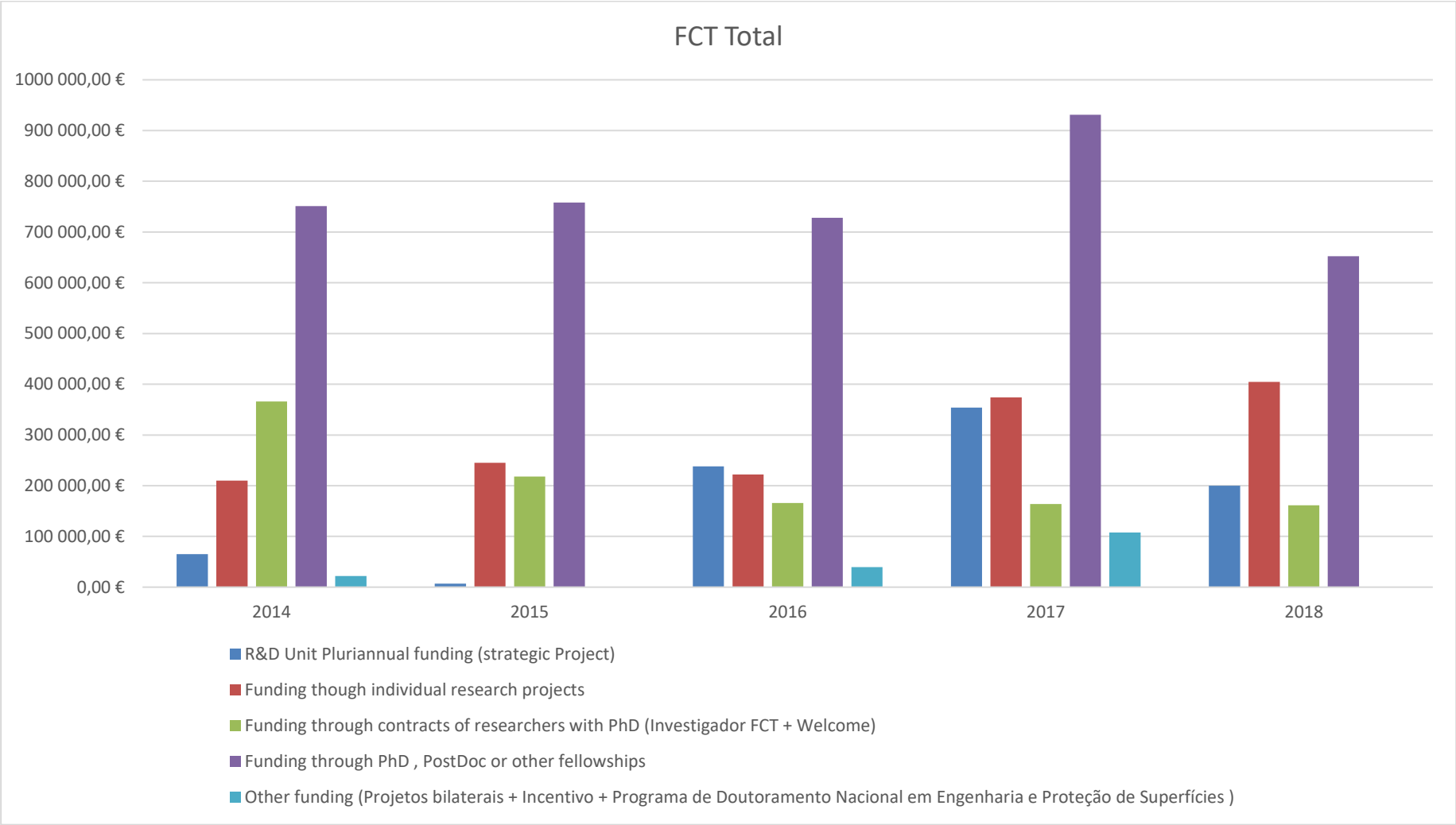
	Expected in 2018	%	Received in 2018	%	Executed in 2018	Number of ongoing projects
Strategic Project (FCT)	226 666.00€	9,73%	184 749,54 €	13%	181 995,11 €	1
FCT Projects	1 573 802,35 €	67,55%	996 779,34 €	68%	370 122,11 €	36
ANI Projects	112 339,71 €	4,82%	82 147,07 €	6%	133 597,60 €	7
Bilateral Projects	2 000,00 €	16,30%	2000 €	1%	500,00 €	1
International Proj. (H2020)	379 838,75 €	0,09%	166 888,00 €	11%	75 243,61 €	4
Doctoral Program (Norte 2020)	35 250,00 €	1,51%	31 556 €	1%	59 098 €	1
Total	**2 273 230,80 €**	**100%**	**1 462 120,25 €**	**100%**	**820 555,97 €**	**50**



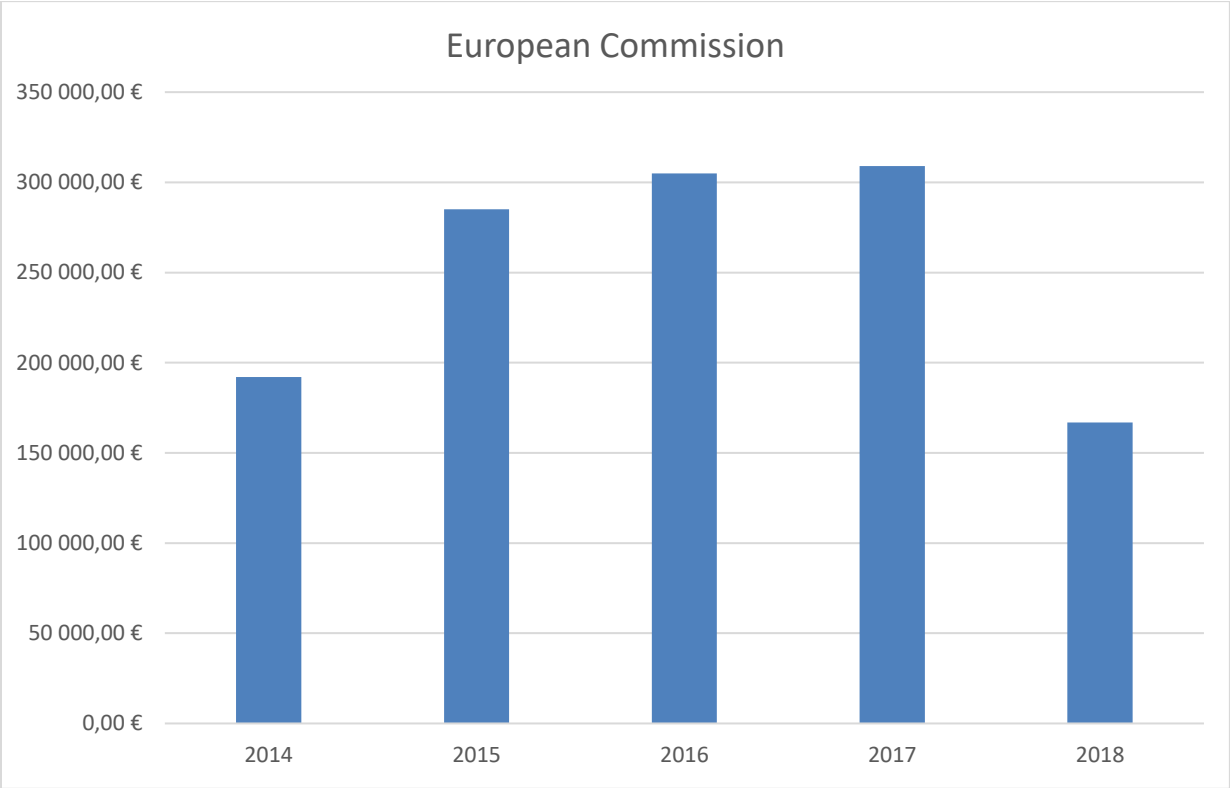
Graph 7: Funding received in 2018



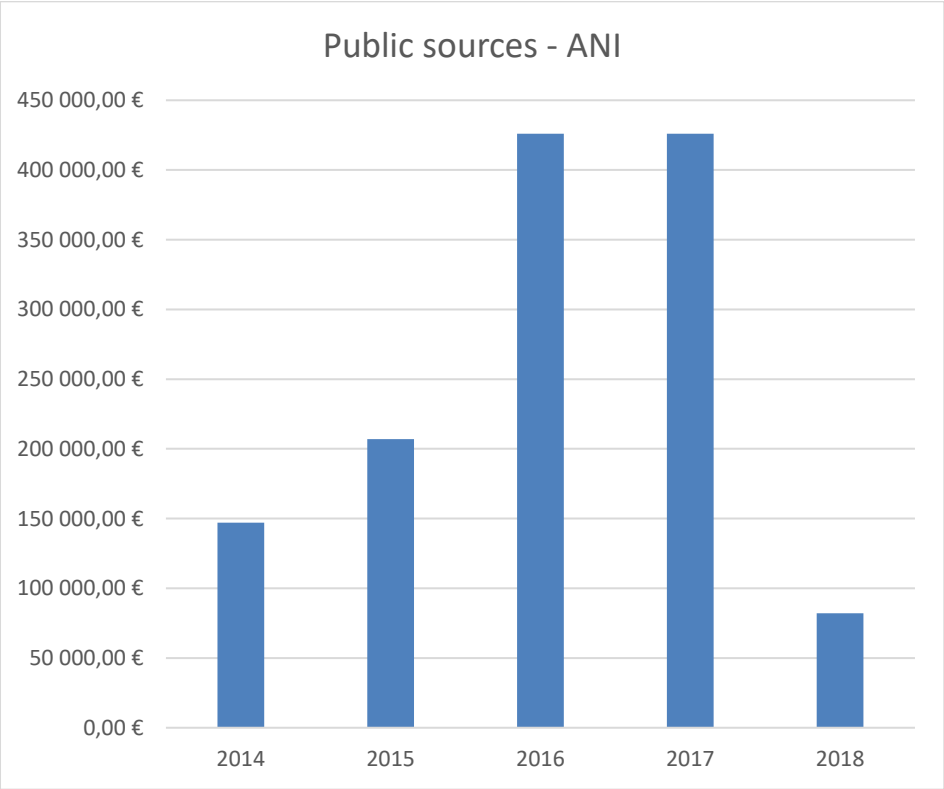
Graph 8: Nº of projects by funding entity



Graph 9: Funding history 2014-2108 (FCT projects)



Graph. 10: Funding history 2014-2108 (European Commission projects)



Graph. 11: Funding history 2014-2108 (ANI projects)

5.6 Scientific Production Indicators by Research Line

	Line 1	Line 2	Line 3	TOTAL
N° Effective Members with Ph.D.	11	22	18	51
Colaborators with PhD – staff members	3	5	5	13
Colaborators with PhD - Post-Docs (contracts in course at31/12/2016)	1	4	16	21
Book (Edited)	0	0	1	1
Book Chapters	2	3	6	11
Regular articles published in ISI Journals	18	42	95	155
Average Journal Impact factor	1.681	4.422	3.902	3.335
Conference Proceedings (ISI)	0	5	2	7
Invited Talks in Scientific Conferences (International/National)	12/3	10/0	10/12	32/15
PhD Theses concluded	1	3	3	7
PhD Theses in progress	9	13	31	53
Externally funded R&D projects (National sourses: FCT, ANI)*	2	17	26	45
Externally funded R&D projects (International sources: H2020)	0	1	3	4
Bilateral Cooperation Projects	0	0	1	1
Collaboration Projects with Industry	0	0	0	0
Patents and patente applications (National/Int)	1/1/2	2/1/2	1	5

*PE not included

6. Description of the Main Activities in 2018 by Research Line

6.1 Assessment and enhancing visual performance

6.1.1 Researchers

Principal investigator	José Meijome
Members	**<u>Effective members of the Centre</u>** - António Baptista - António Macedo - António Queirós Pereira - Daniela Lopes Ferreira - João Manuel Maciel Linhares - Jorge M. Martins Jorge - José M. González Méijome - Madalena Lira - Paulo Fernandes - Since October - Sandra M. Braga Franco - Sérgio M. Cardoso Nascimento **<u>Collaborators</u>** <u>Staff members with PhD</u> - Ana Maria Pinho (UM) - José Alberto Díaz Rey (UM) - Vasco Almeida (UBI) <u>Post-Doctorate Researchers</u> - Miguel Ribeiro - SFRH/BPD/116351/2016 (100%) <u>Integrated PhD students</u> - Alshaarawi Salem (PhD Program in Optometry and Vision Science) - Ana I. Amorim de Sousa (PhD Program in Optometry and Vision Science, FCT Project) - Laura Hernández Moreno (PhD Program in Optometry and Vision Science) - Lina Rodríguez Cely (PhD Program in Optometry and Vision Science) - Pedro Lima - Math Phd Program – FCT Fellowship - Rute J. Macedo de Araújo (PhD Program in Optometry and Vision Science, Industry Project) - Helena I. Ferreira Neves (PhD in Science, FCT Grant – finished - Serguey Roberto Cusato Junior - OCV PhD Program <u>PhD students – Members of other R&D Centres, co-supervised by CFUM reseachers and Part-Time Ph-D students</u> - Eduardo Teixeira - Biomedicine (UBI) - Clara Maria dos Santos Pereira – PhD in Biology

	- Other research students - André Rino Amorim (Research grant holder, FCT Project) - Erna Vukalic (ERASMUS+ student, Velika Gorica University of Applied Sciences, Croatia) - Daliborka Roknic (ERASMUS+ student, Velika Gorica University of Applied Sciences, Croatia) - Masa Klanger (ERASMUS+ student, Velika Gorica University of Applied Sciences, Croatia) - Sofia C. Peixoto de Matos (Invited lecturer 59%)

6.1.2 Brief description of the scientific work carried out within the Research Line in 2018

Assessment and Enhancing Visual Performance Research Line (Line 1) develops competitive research activity in the area of Optics, Optometry and Visual Science. Integrates Senior Researchers, Post-docs, PhD and MSc students providing a continuous feedback between research and lecturing in Vision Science at the Bachelor, Master and PhD levels. Areas of expertise is focused in fundamental and applied Vision Research in binocular vision, color science, epidemiology, instrumentation, ocular surface, ocular accommodation, perception, refractive error development, visual electrophysiology, visual optics, visual performance under challenging conditions and visual rehabilitation. Several competitive projects and industry-initiated studies are hosted including international randomized controlled clinical trials. Close interaction with other national and international departments, schools, research centers and a strong link to industry provide the context to develop multidisciplinary and applied research activity. Members of this research line integrate international scientific societies and hold editorship responsibilities in leading peer-review journals.
At the level of the Center of Physics, members of Line 1 interact with materials scientists, optics and photonics specialists. At the School level is particularly relevant the cooperation of members of Line 1 with researchers at the biology and chemistry department particularly in the field of contact lens material research. Members of the Line 1 also collaborate with Psychology department among others. The researchers of Line 1 continue with a strong link with industry including participation in several national and international studies, from the field of optics, to clinical trials and color vision perception.
During 2018 the research line members have continued involved in research activities related with projects in the field of contact lenses, myopia control, instrumentation, visual performance assessment, visual neuroscience and perception. Members have been involved in the organization of national and international conferences and have presented at several renowned national and international conferences in the field, including several invited lectures. It is to be highlighted also the intense activity of several members in supervision of PhD and MSc students.
The publication rate in ISI WoS journals has got back to a growth track which we expect to continue furing the next few years as consequence of the ongoing projects and numerous MSc and PhD thesis.

During 2018, this research line has been devoted to consolidate new areas of research in the field of visual electrophysiology focused on retinal processing of visual signals and functional resonance magnetic imaging related with visual perception or fundamental research on colour vision, colour vision deficiencies and visual effects of lighting on natural scenes and art paintings and its influence on visual aesthetics, using hyperspectral imaging and adaptative optics techniques. Line members have been involved in several funding applications with UMinho as main host institution or partner that we expect to allow to provide an important boost to research activity in the next few years. Examples include the Colour Science Lab at CFUM-UP in the context of a European

network of collaborations from Italy, to Germany, to the United Kingdom, to Japan, to Spain, to Portugal and to Norway. The Clinical and Experimental Optometry Research Lab at CFUM-UP has been involved in a European Training Network along with another 6 academics and 4 industrial partners from 7 different countries, and a European Research Council grant application. Includes also two applications in the context of Collaboration in Science of Technology (COST) actions.

6.1.3 Future research summary

The future development of the research activity will continue to be focused on the areas of expertise: binocular vision, color science and perception, epidemiology, instrumentation, ocular surface, ocular accommodation, perception, refractive error development, visual electrophysiology, visual optics, visual performance under challenging conditions and visual rehabilitation.
Considering the instability and uncertainty on the side of the national funding opportunities, including delays in Research Centers evaluation process, it will be very important that the European applications in which the members of Line 1 are involved are succesfull to allow to get new opportunities to strength the human resources of the group and update the infrastructural research facilities.
The activity of the research Line will be focused on the following 5 pillars:
- Conduct fundamental research coupling knowledge of visual optics with the electrophysiological assessment of the visual information customized through minimally invasive optical devices in our areas of expertise.
- Consolidate and attract funding to develop the new research topics under development and interlink these with applications in the existing areas of expertise of ocular surface, color vision, visual optics and instrumentation.
- Attract internationally funded projects from public and private initiatives, with particular relevance for the participation and leadership of international consortiums to participate in European projects (COST, FET, ERC, etc).
- Recruit PhD students in the context of the PhD Program in Optometry and Vision Science and post-doc researchers.
- Keep the increasing publication track record and increasing progressively the impact of the articles published.
- Coordinate and participate in international advanced courses and schools that facilitate the exchange of scientific expertise.

6.1.4 Publications

6.1.4.1 Regular articles published in ISI/Scopus Journals

Absent Foveal Pit, Also Known as Fovea Plana, in a Child without Associated Ocular or Systemic Findings.Hernandez-Moreno L, Perdomo NM, Aleman TS, Baskaran K, Macedo AF: Case Reports in Ophthalmological Medicine 2018.

Color constancy of color reproductions in art paintings, Kinjiro Amano, João M. M. Linhares, and Sérgio M. C. Nascimento, J. Opt. Soc. Am. (2018) A 35, B324-B333, https://doi.org/10.1364/JOSAA.35.00B324 - ISI

Combined Effect of Ocular and Multifocal Contact Lens Induced Aberrations on Visual Performance: Center-Distance Versus Center-Near Design. Lopes-Ferreira D, Fernandes P, Queirós A, González-Meijome JM. Eye Contact Lens. 2018;44 Suppl 1:S131-S137. http://hdl.handle.net/1822/49114

Comfort, ocular dryness and equilibrium water content changes of daily disposable contact lenses. Eduardo Insua-Pereira, Madalena Lira.. Eye & Contact Lens (2018). 44: S233-S240. http://hdl.handle.net/1822/48575

Comparison of Central Corneal Thickness measured by Standard Ultrasound Pachymetry, Corneal Topography, Tono-Pachymetry and Anterior Segment Optical Coherence Tomography. González-Pérez J, Sanchez García A, Queiruga J, González-Méijome JM. Current Eye Research. 2018;43(7):866-872. http://hdl.handle.net/1822/57075

Corneal morphology and visual outcomes in LASIK patients after orthokeratology: A pilot study. Queirós A, Villa-Collar C, Amorim-de-Sousa A, Gargallo-Martinez B, Gutiérrez-Ortega R, González-Pérez J, González-Méijome JM. Cont Lens Anterior Eye. 2018;41(6):507-512. doi: 10.1016/j.clae.2018.09.001

Daily versus monthly disposable contact lens: which is better for ocular surface physiology and comfort?. Sapkota K, Franco S, Lira M. Contact Lens and Anterior Eye 41 (2018) 252–257. http://hdl.handle.net/1822/48561

Influence of the use of cane on the gait cycle of individuals who are blind. Santos D, Abrantes JM, Lewis P, Macedo AF: British Journal of Visual Impairment 2018, 36(3):251-261.

Light disturbance with multifocal contact lens and monovision for presbyopia. Fernandes P, Amorim-de-Sousa A, Queirós A, Escandón-Garcia S, McAlinden C, González-Méijome JM. Cont Lens Anterior Eye. 2018;41:393-399. http://hdl.handle.net/1822/57074

On-eye breakage and recovery of mini-scleral contact lens without compromise for the ocular surface. Macedo-de-Araújo RJ, van-der-Worp E, González-Méijome JM. Contact Lens Anterior Eye. 2018;41:311-314.http://hdl.handle.net/1822/57068

Portuguese Visual Impairment S: Predicting participation of people with impaired vision in epidemiological studies. Ramos PL, Santana R, Moreno LH, Marques AP, Freitas C, Rocha-Sousa A, Macedo AF,. Bmc Ophthalmology 2018, 18.

Portuguese Visual Impairment S: The use of informal care by people with vision impairment. Marques AP, Macedo AF, Hernandez-Moreno L, Ramos PL, Butt T, Rubin G, Santana R, Plos One 2018, 13(6).

Predicted accommodative response from image quality in young eyes fitted with diferent dual-focus designs. Faria-Ribeiro M, Amorim-de-Sousa AI, González-Méijome JM. Ophthalmic Physiol Opt. 2018;38:309-316. http://hdl.handle.net/1822/54720

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Other articles

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Eye movements, convergence distance and pupil-size when reading from smartphone, computer, print and tablet. Miranda AM, Nunes-Pereira EJ, Baskaran K, Macedo AF: Scandinavian Journal of Optometry and Visual Science 2018, 11(1):1-5.

6.1.4.2 Books and book chapters

Chapters

Escandón-García S, Fernandes PRB, da-Silva AR, Ribeiro FJ, Salgado-Borges JM, González-Méijome JM. Avaliação da distorção luminosa na cirurgia do cristalino. Ponencia da Sociedade Portuguesa de Oftalmologia. Portugal 2018.

João Linhares, Liliana Cardeira, Ruben Pastilha, Ana Bailão, Sérgio Nascimento, Caracterização Cromática de Pinturas de Adriano de Sousa Lopes, em - ADRIANO DE SOUSA LOPES, Conservação e restauro das obras académicas pertencentes ao espólio da Faculdade de Belas-Artes da Universidade de Lisboa, Liliana Cardeira e Ana Bailão (Editores), Lisboa : Centro de Investigação e Estudos em Belas-Artes : Faculdade de Belas-Artes : Universidade de Lisboa, ISBN 978-989-8771-95-7, http://id.bnportugal.gov.pt/bib/bibnacional/2005689

6.1.5 Conference Presentations

6.1.5.1 Invited talks delivered at Conferences (International/National)

International

António Queirós. "Control de la miopía: Evidencia Científica", EurOk 2018 - III Jornadas Clínicas de Ortoqueratología y control de la Miopía, Santiago de Compostela, 1-3 Junho 2018

González-Méijome, JM, Peixoto-de-Matos SC. Lentes de Contacto en niños y adolescentes. Webinar Latin-America. Bausch+Lomb. August 14th, 2018.

Prevalence and Impact of myopia. OPTOM 2018 - 25 Congreso Internacional de Optometría, Contactología y Óptica Oftálmica. Madrid, Spain. April 13th-15th, 2018. (keynote speaker)

González-Méijome JM. Control de miopía con LC blandas. IberOk 2018. 2-4 de junio 2018. Santiago de Compostela Spain.

González-Méijome, José M. Emmetropization and ocular refractive error.
Aegean Summer School in Visual Optics, 7th-9th July, 2018, Heraklion-Crete (Greece).

González-Méijome, José M. Image quality using computational wavefront metrics.
Aegean Summer School in Visual Optics, 7th-9th July, 2018, Heraklion-Crete (Greece).

González-Méijome, José M. Glare and light disturbances in the ageing eye.
Aegean Summer School in Visual Optics, 7th-9th July, 2018, Heraklion-Crete (Greece).

González-Méijome, José M. Daily disposable contact lenses. Frankfurt, 3rd July, 2018.

González-Méijome, JM. LC Multifocales: uso Clínico de los Mapas de Potencia y Curvas de Desenfoque. Webinar Latin-America. Bausch+Lomb. August 14th, 2018.

González-Méijome, José M. Contact lenses to control myopia progression. MyFUN Marie Curie ITN Summer School, Madrid, October 2018.

João Linhares, Acquiring Paintings with a Hyperspectral Imaging System, second International Colour Vision Society (ICVS) Summer School on Colour from 30th July to 3rd August 2018, at Pembroke College, Pembroke Square, Oxford

Sérgio Ncimento, The chromatic diversity in art paintings, second International Colour Vision Society (ICVS) Summer School on Colour from 30th July to 3rd August 2018, at Pembroke College, Pembroke Square, Oxford

National

António Queirós. "Controlo da Miopia - Evidência Científica da Ortoqueratologia", CAO'S 2018 - XIV Conferências Abertas de Optometria, Porto, 10-11 novembro 2018.

João Linhares. "Lentes Coloridas para Daltónicos", Optomevista 2018, Braga, Abril 2018.

Madalena Lira e Jorge Jorge: Discussão de Casos Clínicos. Encontro Nacional de Optometria (GrandVision). 9 e 18 de abril de 2018, Lisboa.

6.1.5.2 Contributed talks delivered at Conferences (International/National)

International

Madalena Lira. Invited seminar. Concurrent research topics in contact lenses and ocular surface. Linnaeus University, Vaxjo & Kalmar, Sweden, 27 setembro 2018.

JM González-Méijome; Paulo Fernandes; António Queirós. Contact lens wear in 2000 students between 17 and 25 years of age entering University in 2015, 2016 and 2017,OCCSEE&EAOO 2018 Optometry Conference, Pula (Croatia), 11th-13th May, 2018.

Ana Rita Vaz; António Miranda; Rute Macedo-Araújo; Daniela Lopes-Ferreira; Erna Vukalic; Maša Kangler; Daliborka Roknic; Miguel Faria-Ribeiro; Ana Amorim-de-Sousa; André Amorim; Jorge, Jorge; Paulo Fernandes; António Queirós; JM González-Méijome. Refractive and biometric parameters in a Portuguese population of 850 young adults entering University of Minho in 2017,OCCSEE&EAOO 2018 Optometry Conference, Pula (Croatia), 11th-13th May, 2018.

Erna Vukalic; Maša Kangler; Daliborka Roknic; Rita Vaz; António Miranda; Rute Macedo-Araújo; Daniela Lopes-Ferreira; Miguel Faria-Ribeiro; Ana Amorim-de-Sousa; André Amorim; Jorge Jorge; Paulo Fernandes; António Queirós; JM González-Méijome. Spontaneous visual acuity in students registering in the superior education for the first time, OCCSEE&EAOO 2018 Optometry Conference, Pula (Croatia), 11th-13th May, 2018,2018.

Macedo-de-Araujo et al. "Medium-Term Scleral Contact Lens Wear: Visual Acuity and Comfort Ratings and Handling Learning Curve from the Wearer Perspective". Global Special Lens Symposium (GSLS). Las Vegas. January 2018.

Sofia C. Peixoto-de-Matos, Cheryl Ngo, Susie Jones, Debbie Jones, José M. González-Méijome, Graeme Young. Soft contact lens fitting for myopia control: acceptance from children and parents in a randomized controlled double-blind clinical trial. OPTOM 2018 - 25 Congreso Internacional de Optometría, Contactología y Óptica Oftálmica. Madrid, Spain. April 13th-15th, 2018.

José M. González-Méijome, Sofia C. Peixoto-de-Matos, Nicola Logan, Debbie Jones, Seang Mei Saw, Graeme Young. EFICACIA DE UNA LENTE DE CONTACTO BLANDA DE DOBLE FOCO PARA CONTROL DE MIOPíA: RESULTADOS DE 3 AñOS EN UN ENSAYO CLíNICO ALEATORIO, CONTRALADO, DOBLE CIEGO. OPTOM 2018 - 25 Congreso Internacional de Optometría, Contactología y Óptica Oftálmica. Madrid, Spain. April 13th-15th, 2018.

Santiago Escandón-García, José M. González-Méijome. ATENUACIóN EN LAS DISTORSIONES LUMINOSAS Y QUEJAS SUBJETIVAS TRAS 6 MESES DE IMPLANTACIóN BINOCULAR CON LENTES MULTIFOCALES DE NUEVA GENERACIÓN. OPTOM 2018 - 25 Congreso Internacional de Optometría, Contactología y Óptica Oftálmica. Madrid, Spain. April 13th-15th, 2018.

César Villa-Collar, Alucia Ruiz-Pomeda, Ana Amorim-de-Sousa, José M. González-Méijome, Francisco Prieto, Belén Pérez. DISTORSIÓN LUMINOSA CON LENTES DE CONTACTO DE DOBLE FOCO PARA EL CONTROL DE LA MIOPÍA EN NIÑOS. OPTOM 2018 - 25 Congreso Internacional de Optometría, Contactología y Óptica Oftálmica. Madrid, Spain. April 13th-15th, 2018.

Macedo-de-Araújo Rute J, Amorim-de-Sousa, Ana I, Van der Worp E, González-Méijome José M. Previsibilidad de los parámetros de altura sagital de la topografía corneal na adaptación de lentes de contacto esclerales. OPTOM 2018 - 25 Congreso Internacional de Optometría, Contactología y Óptica Oftálmica. Madrid, Spain. April 13th-15th, 2018.

Macedo-de-Araújo Rute J, Van der Worp E, Amorim-de-Sousa, Ana I, González-Méijome José M. Resultados Objetivos y Subjetivos de Adaptación de Lentes de Contacto Esclerales en Corneas Pos-Quirúrgicas. OPTOM 2018 - 25 Congreso Internacional de Optometría, Contactología y Óptica Oftálmica. Madrid, Spain. April 13th-15th, 2018.

Ana Amorim-de-Sousa; Rute Macedo-Araújo; António Queirós; Paulo Fernandes; JM González-Méijome. Evaluación del vault en la adaptación de lentes de contacto esclerales con un biómetro óptico ,25° Congreso Internacional de Optometría, Contactología y Óptica Oftálmica, OPTOM 2018, Madrid,2018.

González-Méijome José M.; Fernandes, Paulo; Macedo-de-Araújo, R; Vaz, AR.; Amorim-de-Sousa, Queirós, António. Contact Lens Wear in 2000 Students Between 17 and 25 Years of Age Entering University of Minho in 2017.
European Academy of Optometry and Optics (EAOO) Meeting, 11th-13th May, 2018 Pula (Croatia).

Miranda, António; Macedo-de-Araújo, R; Amorim-de-Sousa, A.; Peixoto-de-Matos, Sofia C.; González-Méijome, José M. Objective Measurement of Astigmatism Induced by Decentration of a Bifocal Contact Lens.
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González-Méijome, José M.; Miranda, António; Amorim-de-Sousa, AI, Macddo-de-Araújo, RJ.; Peixoto-de-Matos, Sofia C. Changes in Ocular Accommodation with Bifocal Contact Lenses with Continuous Viewing and Intermittent Visual Deprivation Between Target Vergences. European Academy of Optometry and Optics (EAOO) Meeting, 11th-13th May, 2018 Pula (Croatia).

González-Méijome, José M. Innovation in Contact Lenses.
European Academy of Optometry and Optics (EAOO) Meeting, 11th-13th May, 2018 Pula (Croatia).

González-Méijome, José M; Amorim-de-Sousa, Ana I. Topographical diversity and function of retinal cells populations. European Academy of Optometry and Optics (EAOO) Meeting, 11th-13th May, 2018 Pula (Croatia).

González-Méijome, José M; Fossetti, Alesssandro. Understanding the Optics of Myopia Control Lenses. European Academy of Optometry and Optics (EAOO) Meeting, 11th-13th May, 2018 Pula (Croatia).

González-Méijome, José M. Implementation of Myopia Control
Into Practice. European Academy of Optometry and Optics (EAOO) Meeting, 11th-13th May, 2018 Pula (Croatia).

Macedo-de-Araújo R, van der Worp E, Amorim-de-Sousa A, Beerten R, González-Méijome JM. Medium-Term Performance of Scleral Contact Lenses in Irregular and Healthy Corneas: Results of Visual Acuity, Symptomatology and Halometry. Netherland Contact Lens Conference (NCC2018). Veldhoven, The Netherlands.

Faria-Ribeiro M, González-Méijome JM. Multifocal contact lenses: towards customization?. Visual and Physiological Optics (VPO) Meeting, Athens, August 2018. Greece.

González-Méijome, José M. Contact lenses to control myopia progression. MyFUN Marie Curie ITN Summer School, Madrid, October 2018.

Laura Hernández_Moreno, Natacha Moreno Perdomo, Pedro Lima Ramos, Peter Lewis, João Linhares, Hugo Senra, Rui Santana, Antonio Filipe Macedo; Visual and psychological outcomes in patients with and without low vision diagnosed with similar eye diseases - initial results.. Invest. Ophthalmol. Vis. Sci. 2018;59(9):3411.

Antonio Filipe Macedo, Diana Santos, Laura Hernández_Moreno, Marta Leitao, Keziah Latham, Joao Linhares; Exploring barriers to physical activity faced by people with vision loss. Invest. Ophthalmol. Vis. Sci. 2018;59(9):1070.

Joao Linhares, Cristina Montagner, Ana Bailão, Nobuyo Okada, Kanako Maruchi, Taisei Kondo, Shigeki Nakauchi, Sérgio Nascimento; Chromatic differences between colours retrieved from RGB and hyperspectral images. Journal of Vision2018;18(10):588. doi: 10.1167/18.10.588.

Shigeki Nakauchi, Taisei Kondo, Hiroshi Higashi, João Linhares, Sérgio Nascimento; Color statistics underlying preference judgement for art paintings. Journal of Vision 2018;18(10):867. doi: 10.1167/18.10.867.

Dora Marques, Jorge Jorge, João Linhares, DIFERENCIAS EN LA VISIÓN DEL COLOR ENTRE OJOS CORTOS Y LARGOS PALABRAS CLAVE , OPTOM 2018, 25 Congreso Internacional de Optometría, Contactología y Óptica Oftálmica., Madrid, Abril 2018.

Andreia E. Gomes, Andreia R. Carpinteiro, João M. M. Linhares, J. M. Oliveira, Sérgio M. C. Nascimento, CHROMATIC VARIATIONS OF MATCHA GRANOLA ASSESSED BY HYPERSPECTRAL IMAGING, second International Colour Vision Society (ICVS) Summer School on Colour from 30th July to 3rd August 2018, at Pembroke College, Pembroke Square, Oxford

Anke Marit Albers, Florian Schiller, Karl Gegenfurtner, Sérgio Nascimento; Color categories in aesthetic preferences for paintings. Journal of Vision 2018;18(10):869. doi: 10.1167/18.10.869.

Kinjiro Amano, Sérgio Nascimento; Influence of natural illumination changes on hue statistics in natural scenes. Journal of Vision2018;18(10):216. doi: 10.1167/18.10.216.

Sérgio Nascimento, Anke Marit Albers, Karl Gegenfurtner; Naturalness and aesthetics of colors in the human brain. Journal of Vision 2018;18(10):868. doi: 10.1167/18.10.868.

Ruben Pastilha, João Linhares, Sérgio Nascimento, A coloured filter to improve erythema detection against normal skin for a protanope observer – a case report. second International Colour Vision Society (ICVS) Summer School on Colour from 30th July to 3rd August 2018, at Pembroke College, Pembroke Square, Oxford

Rodrigues C, Rodrigues P, Macedo A, Baskaran K: EYE TRACKING THE IMPACT OF IN-STORE SENSORY AND PRICE MESSAGES ON VISUAL ATTENTION AND INTENDED PURCHASE BEHAVIOR. In: 13th Global Brand Conference of the Academy of Marketing: 2018; 2018.

National

Ana Filipa Pereira Mota, Ana Amorim-de-Sousa, Paulo Fernandes; André Amorim; António Queirós; JM González-Méijome. "Avaliação da Resposta Acomodativa com Protótipos de Lentes de Contacto para o Controlo da Progressão da Miopia", CAO'S 2018 - XIV Conferências Abertas de Optometria, Porto, 10-11 novembro 2018.

Ana Rita Vaz; António Miranda; Rute Macedo-Araújo; Daniela Lopes-Ferreira; Erna Vukalic; Maša Kangler; Daliborka Roknic; Miguel Faria-Ribeiro; Ana Amorim-de-Sousa; André Amorim; Jorge, Jorge; Paulo Fernandes; António Queirós; JM González-Méijome, "Caracterização Refrativa dos alunos inscritos na Universidade do Minho no ano 2017", CAO'S 2018 - XIV Conferências Abertas de Optometria, Porto, 10-11 novembro 2018.

Catarina Martins; Carolina Vieira; Ana Amorim-de-Sousa; Rute Macedo-de-Araújo; Jaume Pauné; Miguel A. Faria-Ribeiro; José M. González-Méijome; António Queirós "Performance Visual com Lentes de Contacto Multifocais Desenhadas para o Controlo da Miopia", CAO'S 2018 - XIV Conferências Abertas de Optometria, Porto, 10-11 novembro 2018.

Mota A, González-Méijome JM. Avaliação da Resposta Acomodativa com Protótipos de Lentes de Contacto para o Controlo da Progressão da Miopia. XIV Edition Conferências Abertas de Optometria (CAOs 2016). Porto – November 9-11, 2018.

Martins C, Queirós A, González-Méijome JM. Performance Visual com Lentes de Contacto Multifocais Desenhadas para o Controlo da Miopia. XIV Edition Conferências Abertas de Optometria (CAOs 2016). Porto – November 9-11, 2018.

Vaz AR, González-Méijome. Caracterização Refrativa dos alunos inscritos na Universidade do Minho no ano 2017– "Visão Superior 2017". XIV Edition Conferências Abertas de Optometria (CAOs 2016). Porto – November 9-11, 2018.

Macedo-de-Araújo RJ, van der Worp E, González-Méijome JM. Avaliação da Topografia Escleral Anterior: Diferenças entre Olhos com Córneas Regulares e Córneas Irregulares & Mudanças na Forma Esclero-Conjuntival após Uso de Lentes Esclerais. XIV Edition Conferências Abertas de Optometria (CAOs 2016). Porto – November 9-11, 2018.

Escandón-García S, González-Méijome JM. Disfotópsias na Cirurgia de Substituição de Lente Refrativas: Avaliação de Distúrbios Luminosos no Antes e Depois. XIV Edition Conferências Abertas de Optometria (CAOs 2016). Porto – November 9-11, 2018.

João Linhares; Liliana Cardeira; Ana Bailão; Ruben Pastilha; Sérgio Nascimento; Caracterização da influência do verniz nas obras académicas de Adriano de Sousa Lopes, II colóquio investigações em conservação do património, Faculdade de Belas Artes, Lisboa, Portugal, Setembro 2018

Ana Alvares, Ana Bailão, Isabel Rute Fontinha, João Linhares, A Corrosão Atmosférica nas esculturas de Gonçalo Jardim, II colóquio investigações em conservação do património, Faculdade de Belas Artes, Lisboa, Portugal, Setembro 2018

Andreia Gomes, João Linhares, Sérgio Nascimento, ATMOSPHERIC DISTURBANCES IN THE CHROMATIC PERCEPTION OF COMPLEX NATURAL SCENES - COMPARISION BETWEEN URBAN AND RURAL SCENES XV Congresso Internacional em Optometria e Ciências da Visão (CIOCV), Braga, Universidade do Minho, Abril, 2018.

Catarina F. M. Herdeiro, João M.M. Linhares, Sérgio M.C. Nascimento, Taisei Kondo, Yukinori Misaki, Shigeki Nakauchi, Otimização da iluminação para pinturas com a psicofísica – influência de fatores culturais XV Congresso Internacional em Optometria e Ciências da Visão (CIOCV), Braga, Universidade do Minho, Abril, 2018.

6.1.6 National/International Patents

Eye tracking calibration system with artificial eyes (N. refª P632.2). Inventors: Flávio Pedro Gonçalves Fernandes Ferreira (Bosch Car Multimédia); António Filipe Teixeira Macedo (Linnaeus University / University of Minho); Isabel Maria Ferreira Marques (Bosch Car Multimedia); Marco António Neves Sousa (Bosch Car Multimedia); Hélder Tiago Correia (Bosch Car Multimedia); Eduardo Jorge Nunes Pereira (University of Minho); Boris Paul Jean Bret (Bosch Car Multimedia)

National Patetn "Methods and procedures to optimize optical devices for visual correction". Faria-Ribeiro M, González-Méijome JM. Submitted to INPI at August 7th 2018.

6.1.7 SPIN-OFFS, START-UPS

6.1.8 Supervision of Research Students

6.1.8.1 PhD projects completed in 2018

Author	Supervisor	Title	Situation
Helena I. Ferreira Neves	José M. González Méijome, António Queirós	Analysis of Light Visual Distortion and Quality of Vision with Different Multifocal Lens Designs for the Compensation of Presbyopia	Presented successfully December 2018 ECUM

6.1.8.2 PhD projects in progress

Author	Supervisor	Title	Situation
Clara Maria dos Santos Pereira	Paula Sampaio e Madalena lira	Uma nova visão para as lentes de contacto	Phd Biology
Rute Juliana Ferreira Macedo de Araújo (PhD-OCV)	José M González-Méijome	Clinical performance and biological interactions in scleral contact lens wear	OCV

	Eef van der Worp (Holanda)		
Ana Isabel Carvalho Amorim de Sousa (PhD-OCV)	José M González-Méijome António Queirós Pereira	Selective optoelectrophysiological stimulation of the human retina with a novel microstimulation paradigm	OCV
Eduardo Teixeira	Francisco Bardo (UBI), António Baptista	Os Principais Problemas de Visão na Europa: a Perspetiva Portuguesa	Biomedicina (UBI)
Alshaarawi Salem	António Baptista	To define	OCV
Laura Hernández Moreno	Filipe Macedo	To define	OCV
Lina Rodríguez Cely	To define	To define	OCV
Pedro Lima	Filipe Macedo	To define	PhD in Science (Math)
Serguey Roberto Cusato Junior	To define	To define	OCV

6.1.8.3 MSc projects completed in 2018

Author	Supervisor	Title	Situation
Ana Rita Oliveira Vaz	José M González-Méijome António Queirós Pereira	Caracterização refractiva, ocular e visual dos novos estudantes da Universidade do Minho	Advanced Optometry
Catarina Maria Veloso Martins	José M González-Méijome António Queirós Pereira	Performance Visual e qualidade óptica com lentes de contacto multifocais desenhadas para o controlo da progressão da miopia	Advanced Optometry
Ana Carolina Franco Vieira	José M González-Méijome António Queirós Pereira	Estudo da aberrometria e refracção periférica em lentes de contacto desenhadas para o controlo da progressão da miopia	Advanced Optometry
Joana Filipa Ribeiro Domingues (MOA)	José M González-Méijome Miguel Faria Ribeiro	Variações Temporais e Espaciais na Resposta Eletrofisiológica da Retina Durante a Adaptação a Dispositivos Óticos Multifocais	Advanced Optometry
Linda Dália da Silva Moreira (MOA)	José M González-Méijome Jorge Manuel Martins Jorge	Repetibilidade da medida da atividade retiniana em usuários de lentes de contacto de diferentes materiais em sujeitos míopes	Advanced Optometry
Ângela Domingues de Almeida	Madalena Lira	Relatório de Atividade Profissional ao abrigo Despacho RT-38/2011	Advanced Optometry

Elsa Maria de Oliveira Miguens	Madalena Lira	Relatório de Atividade Profissional ao abrigo Despacho RT-38/2011	Advanced Optometry
Gustavo Adolfo Coelho Marin	Madalena Lira e Elisabete Coutinho	Variação da Transmitância, Refletância e Índice de Refração das Lentes de Contacto: Influência da Potência e do Material das Lentes	Advanced Optometry
Celeste Carla Costa Lago	Madalena Lira	Alterações no tempo de rotura lacrimal e parâmetros da topografia corneal após instilação de lágrima artificial	Advanced Optometry
SÓNIA CLÁUDIA MARTINS JESUS	Madalena Lira	Desempenho *in vivo* da humectabilidade das lentes de contacto	Advanced Optometry
Rui Felipe Pinto Oliveira	Madalena Lira e Gabriela Botelho	Influência das soluções de manutenção na transmitância e refletância de lentes de contacto	Advanced Optometry
Andreia Esteves Gomes	João Linhares e Sérgio Nascimento	*Perturbações Atmosféricas na Perceção Cromática de Cenários Naturais Complexos*	Advanced Optometry
Ruben Carpinteiro Pastilha	João Linhares e Sérgio Nascimento	Chromatic Filters for colour vision deficiencies	Advanced Optometry
Ana Isabel Bastos Ribeiro da Silva	João Linhares	Optometry in a Ophthalmology environment	Advanced Optometry
Sara Manuela Ribeiro Marinho	João Linhares	A influência dos meios oculares na percepção do teste de visão das cores de Ishihara	Advanced Optometry

6.2. Physics of quantum materials and bionanostructures

6.2.1. Researchers

Principal investigator	Paulo José Gomes Coutinho
Members	**<u>Effective members of the Centre</u>** - Anabela Gomes Rolo - Bernardo Gonçalves Almeida - Eduardo Pereira - Elisabete Maria dos Santos Castanheira Coutinho - Etelvina Gomes - Gaspar Machado - Gueorgui Vitalievitch Smirnov - João Pedro Santos Hall Agorreta Alpuim - Jorge Figueiredo - Luís Manuel Gomes Vieira - Maria de Fátima Guimarães Cerqueira - Maria Elisabete da Cunha Dias Real Oliveira - Mário Rui da Cunha Pereira - Marlene Susana Dionísio Lúcio - Michael Scott Belsley - Mikhail Igorevich Vasilevskiy - Nuno Miguel Machado Reis Peres - Paulo José Gomes Coutinho - Ricardo Pedro Lopes Martins de Mendes Ribeiro - Rui Pereira - Sofia Lopes - Stephane Louis Clain **Collaborators** <u>Staff members with PhD</u> - José Carlos Viana Gomes (Singapore National University) - José Luis Ribeiro (UM) - Júlia Maria Simões Dias Barata de Tovar Ayres de Campos (UM) - Maria José Sampaio (UM) - Teresa Maria Santos Ribeiro Viseu (UM) <u>-Post-Doctorate Researchers</u> - Ana Rita Oliveira Rodrigues – Fellowship in the framework of Strategic Project - Jaime Eduardo Vieira Silva Moutinho Santos Project Uminho/Bosch (UMINHO/BI/214/2016) (50%) - Joel Borges - SFRH/BPD/117010/2016 (85%) -Yuliy Bludov European Project Graphene FPA – 649953 (UMINHO/BPD/20/2016) (100%) <u>Integrated PhD students</u> - André Chaves (PhD in Sciences, speciality in Physics) – Finished

- Balaji Sompalle (PhD in Physics, MAP-Fis)
- César Rui Freitas Bernardo (PhD in Physics MAP-Fis; FCT grant SFRH/BD/102616/2014)
- Filipe André Peixoto Oliveira (PhD in Physics MAP-Fis, completed in june 2018)
- Hugo Manuel Castro Gonçalves (PhD in Physics MAP-Fis; Grant from MAP-Fis Doctoral Program)
- Ícaro Jael Mendonça Moura (PhD in Physics MAP-Fis, CAPES Grant, Brazil)
- Nuno Miguel Teles Oliveira (PhD in Sciences - Mathematics)
- Patrícia Daniela Cabral da Silva (PhD in Physics MAP-Fis, FCT grant SFRH/BD/128579/2017)
- Ramya Gummadi (PhD in Physics MAP-Fis)
- Gonçalo Catarina (PhD in Physics MAP-Fis)
- Beatriz Dias Cardoso (PhD in Materials Engineering; FCT grant SFRH/BD/141936/2018, start October 2018)

PhD students – Members of other R&D Centres, co-supervised by CFUM reseachers and Part-Time Ph-D students

- George Luiz Machado Junior (PhD in Materials Engineering; CNPq GDE(CsF) grant: 237630/2012-5, Brazil)
- Danilo Pedrelli (PhD in Physics MAP-Fis; Prog. Universidade do Pará - Brazil)
- João Faria (PhD in Physics MAP-Fis)
- Catarina Abreu (PhD in Health and Medical Studies, Swansea University Medical School)
- Andreia Marina de Sousa Almeida (PhD programme in Biomedical Sciences, Institute of Biomedical Sciences Abel Salazar, University of Porto)

Other research students

- Ana Isabel Ferreira Lopes (MSc student, start September 2018)
- Ana Rita Pereira Caldas (MSc student)
- Beatriz de Amorim Ferreira (Researcher, BI grant)
- Carlos Adalberto Brito Magalhães (MSc student)
- Daniela Ferreira Gomes (MSc student, until April 2018)
- Daniela Sofia Marques Pereira (Researcher with MSc degree)
- Diana Isabela Faria Meira (MSc student, until December 2018)
- Eduarda Barbosa Fernandes (Researcher with MSc degree, BI grant)
- Irina Soraia Rainho Rio (MSc student)
- João Marco Carneiro Ferreira (MSc student)
- João Marcos de Sousa (MSc student, start October 2018)
- João Miguel Fernandes Araújo (MSc student, until November 2018)
- Jorge Silva (MSc student, until January 2018)
- José Diogo Pinto (MSc student, start October 2018)
- José Nuno Santos Gomes (Researcher, BI grant)
- Manuel José de Lima Rodrigues (Researcher with MSc degree, BI grant)
- Maria João Fernandes Faria (MSc student)
- Maria Lúcia Miranda Gomes (MSc student, until July 2018)
- Maria Manuela Carvalho Proença (MSc student, until January 2018)
- Mariana Isabel C. N. Almeida Monteiro (MSc student, until December 2018)
- Marina Alves (MSc student, until November 2018)
- Marisol de Gouveia Dias (MSc student)
- Micael Moreira Alves (MSc student; 50% Line 1)
- Patrícia Alexandra Pereira da Silva (MSc student, until December 2018)
- Pedro Cruz de Sousa Braga (MSc student, start October 2018)
- Pedro Filipe Cardoso da Silva (MSc student)

	- Pedro Miguel Coxixo Xarepe (MSc student) - Raquel Gaudência Dias Andrade (MSc student, start September 2018) - Ricardo Jorge Cunha Fernandes (MSc student, until December 2018) - Sara Daniela Pimentel Guimarães (MSc student, until July 2018) - Sarah Brito Bogas (MSc student) - Sérgio Rafael da Silva Veloso (MSc student - start June 2018, BI grant) - Telma Bezerra Soares (Researcher with MSc degree) - Tatiana Vilhena Torres Ventura (MSc student, until March 2018)

6.2.1. Brief description of the scientific work carried out within the Research Line in 2018

Thin films composed of noble nanoparticles (Au, Ag) dispersed in dielectric matrixes, with localized Surface Plasmon Resonances (LSPR), were developed, for gaseous detection, biosensing and photonic applications. The thin films were prepared by magnetron sputtering and post-deposition thermal annealing.
The structural and vibrational properties of Sn_xGe_{1-x} semiconductor solid solution were investigated, as well as polaritons in multilayer semiconductor structures.
Concerning the properties and applications of graphene, the research was focused on the plasmonic properties of graphene. The magnetic-field-assisted transmission of THz waves through graphene layers combined with periodically perforated metallic film was also investigated. DFT, GW and Bethe-Salpeter equation calculations of defects in single layer h-BN were carried out.
Wafer scale graphene microelectrode arrays (fabricated at INL) were used for the detection of DNA hybridization. Immuno-field-effect transistor platforms based on 2D materials were developed for early detection of biomarkers of ischemic stroke. The optoelectronic characterization of chalcogenide solar cells and 2D materials was carried out.
Lipid based nanocarriers and polymeric based scaffolds were developed for the encapsulation of different drugs (anticancer, anti-inflammatory, antidepressive) and bioactives, for pharmaceutical applications. Graphene oxide quantum dots were tested for drug delivery purposes. High throughput screening biophysical methods were applied for in vitro pharmacokinetic profiling of encapsulated drugs/bioactives.
Magnetic nanoparticles based on several ferrites and combined ferrite/gold were developed and entrapped or covered with a lipid bilayer, forming magnetoliposomes for applications in dual cancer therapy (combined chemotherapy and magnetic hyperthermia /phototherapy). Novel magnetogels, combining new peptide based hydrogels and magnetic nanoparticles were developed for applications in synergistic and targeted therapy.
The environmental applications of magnetic nanostructures were also exploited, focusing on fluorine-doped cobalt/zinc titanate and zinc/calcium ferrite nanoparticles combined with silver. Highly-ordered silicon nanowire arrays were explored for improved hydrogen evolution.
The physical origins underlying the strong second harmonic generation of centrosymmetric molecules embedded in sub-micron polymeric structures was investigated. A series of novel chromophores with enhanced nonlinear optical responses was developed and characterized.
In the field of Mathematical Physics, peak effects in stable linear difference equations were investigated, as well as the high-order finite volume scheme for two-dimensional steady-state convection-diffusion equation and one dimensional steady-state hyperbolic equations. Mathematical models were applied to sustainable water management, specifically considering evapotranspiration and planning of different crops in a field.

6.2.2. Future research summary

The future research will be focused on theory and modelling of new mechanisms of excitation of surface plasmon-polaritons in graphene-based structures with potential applications to sensing. DFT (GW and Bethe-Salpeter equation) calculations of defects in single layer h-BN and other 2D materials with applications in single photon emitters, will be continued.
The optimization of LSPR thin films for optical molecular sensing of gases and bioanalytes will be continued.
Research on lipid based nanocarriers will be focused on further developing the pharmaceutical, dermocosmetical and nutraceutical applications and also joining hybrid nanostructures with other materials and scaffolds for the development of functional materials.
The optimization of multifunctional magnetic bionanosystems (core/shell and decorated nanoparticles, magnetoliposomes, magnetogels) will be continued for applications in synergistic and targeted therapy.
Photovoltaic Grätzel cells with co-sensitization by quantum dots and dyes will be developed, using solid electrolytes such as CuSCN+CuS. The photoconversion of water in hydrogen will be attained using g-C3N4 coupled with magnetic nanoparticles and using pollutants as sacrificial donors.
Ultrafast and nonlinear spectroscopy will be employed to explore the exciton dynamics of quantum dot systems placed within the near-field of metallic surfaces and a variety of 2D materials.
The application of mathematical modelling and optimization methods to issues raised by climate changes will be continued.

6.2.3. Publications

6.2.3.1. Regular articles published in ISI/Scopus Journals

A posteriori stabilized sixth-order finite volume scheme for one-dimensional steady-state hyperbolic equations, S. Clain, R. Loubère and G. J. Machado, Advances in Computational Mathematics 44(2), 571-607 (2018); http://hdl.handle.net/1822/57481

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Effect of the Soldering Atmosphere on the Wettability Between Sn4.0Ag0.5Cu (in wt.%) Lead-Free Solder Paste and Various Substrates, D. Soares, H. Leitão, C.S. Lau, J.C. Teixeira, L. Ribas, R. Alves, S. Teixeira, M. F. Cerqueira and F. Macedo, Journal of Materials Engineering and Performance 1-7 (2018); http://link.springer.com/article/10.1007/s11665-018-3419-2 (with DEM/EEUM)

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Probing Nonlocal Effects in Metals with Graphene Plasmons, Eduardo J. C. Dias, David Alcaraz Iranzo, P. A. D. Gonçalves, Yaser Hajati, Yuliy V. Bludov, Antti-Pekka Jauho, N. Asger Mortensen, Frank H. L. Koppens and N. M. R. Peres, Physical Review B 97, 245405 (2018).

Probing of Thermal Transport in 50 nm Thick PbTe Nanocrystal Films by Time-Domain Thermoreflectance, Miguel Franco, Viviana Sousa, José Rodrigues, Francis Leonard Deepak, Yohei Kakefuda, Naoyuki Kawamoto, Tetsuya Baba, Bryan Owens-Baird, Pedro Alpuim, Kirill Kovnir, Takao Mori, Yury V. Kolen'ko and Marek Piotrowski, J. Phys. Chem. C 122, 27127-27134 (2018); DOI: 10.1021/acs.jpcc.8b04104; http://hdl.handle.net/1822/57697

Probing the ultimate plasmon confinement limits with a van der Waals heterostructure, David Alcaraz Iranzo, Sébastien Nanot, Eduardo J. C. Dias, Itai Epstein, Cheng Peng, Dmitri K. Efetov, Mark B. Lundeberg, Romain Parret, Johann Osmond, Jin-Yong Hong, Jing Kong, Dirk R. Englund, N. M. R. Peres and Frank H. L. Koppens, Science 360, 291 (2018).

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Spectroscopic Studies as a Toolbox for Biophysical and Chemical Characterization of Lipid-Based Nanotherapeutics, Eduarda Fernandes, Telma B. Soares, Hugo Gonçalves and Marlene Lúcio, Frontiers in Chemistry 3, 323-343 (2018); https://doi.org/10.3389/fchem.2018.00323

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Synthesis of pyridazine derivatives by Suzuki-Miyaura cross-coupling reaction and evaluation of their optical and electronic properties through experimental and theoretical studies, S. S. M. Fernandes, M. Belsley, J. Aires-de-Sousa and M. M. M. Raposo, Molecules 23, 3014 (2018); http://hdl.handle.net/1822/57134 (with CQUM)

Terpyridine derivatives functionalized with (hetero)aromatic groups and the corresponding Ru complexes: synthesis and characterization as SHG chromophores, S. S. M. Fernandes, M. Belsley, C. Ciarrocchi, M. Licchelli and M. M. M. Raposo, Dyes and Pigments 150, 49-58 (2018); http://hdl.handle.net/1822/49648 (with CQUM)

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The influence of nanocrystal size on optical second harmonic generation by para-nitroanaline embedded in electro-spun polymeric fibers, Hugo Gonçalves, Inês Saavedra, Marlene Lúcio, Sigrid Bernstorff, Etelvina de Matos Gomes and Michael Belsley, Journal of Nanoparticle Research 20, 248 (2018); https://doi.org/10.1007/s11051-018-4356-6

Theoretical and experimental studies of aryl-bithiophene based push-pull pi-conjugated heterocyclic systems bearing cyanoacetic or rhodanine-3-acetic acid acceptors for SHG nonlinear optical applications, S. S. M. Fernandes, C. Herbivo, J. Aires-de-Sousa, A. Comel, M. Belsley and M. M. M. Raposo, Dyes and Pigments 149, 566-573 (2018); http://hdl.handle.net/1822/49645 (with CQUM)

Tunable performance of manganese oxide nanostructures as MRI contrast agents, M. Bañobre-Lopéz, Lorena García-Hevia, M. F. Cerqueira, F. Rivadulla and J. Gallo, Chemistry - A European Journal 24, 1295-1303 (2018); https://doi.org/10.1002/chem.201704861

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Wafer scale fabrication of graphene microelectrode arrays for the detection of DNA hybridization, R. Campos, G. Machado Jr., M. F. Cerqueira, J. Borme and P. Alpuim, Microelectronic Engineering 189, 85-90 (2018); http://hdl.handle.net/1822/48567

6.2.3.2. Books and book chapters

Chapters

Magnetoliposomes for dual cancer therapy Ana Rita O. Rodrigues, B. G. Almeida, Maria João R. P. Queiroz, J. P. Araújo, Paulo J. G. Coutinho and Elisabete M. S. Castanheira, , Book chapter in Pharmaceutical Nanotechnology Series, Volume 7 – Inorganic Frameworks as Smart Nanomedicines, Chapter 11, pp. 489-527; A. M. Grumezescu (Editor), Elsevier, May 2018; https://doi.org/10.1016/B978-0-12-813661-4.00011-0; http://hdl.handle.net/1822/56108

Lipid-based colloidal carriers for topical application of antiviral drugs Carla M. Lopes, Juliana Silva, M. Elisabete C. D. Real Oliveira and Marlene Lúcio, Book chapter in Pharmaceutical Nanotechnology Series, Volume 3 – Design of nanostructures for versatile therapeutic applications, Chapter 14, pp. 565-622; A. M. Grumezescu (Editor), Elsevier, 2018; https://doi.org/10.1016/B978-0-12-813667-6.00014-0

, A scheduling application to a molding injection machine: a challenge addressed on the 109th European Study Group with Industry I. Lopes, Sofia O. Lopes, R. M. S. Pereira, S. Teixeira and A. Vaz, Book chapter in Progress in Industrial Mathematics at ECMI 2016, Springer, ISBN 978-3-319-63081-6, March 2018; https://doi.org/10.1007/978-3-319-63082-3_83; http://hdl.handle.net/1822/55632

6.2.3.3. Conference Proceedings with Pier Review appearing in the ISI Database

Translucency, contrast ratio and fluorescence of esthetic materialA. E. C. Kauling, C. A. M. Volpato, O. S. N. Carvalho, M. R. C. Pereira and J. F. Güth, s, Proceedings of Academy of Dental Materials Annual Meeting, 04-06 October 2018 - Porto de Galinhas, Brazil; Dental Materials, Volume 34, Supplement 1, e127 (2018); https://doi.org/10.1016/j.dental.2018.08.263

A biophysical approach to formulation development: drug-plasma protein interaction E. Fernandes, T. Soares, M. Elisabete C. D. Real Oliveira, C. M. Lopes and M. Lúcio, , Proceedings of the Nanotech France 2018 International Conference, Paris, France, June 27-29 (2018); https://doi.org/10.26799/cp-nanotechfrance2018

Tamm Polaritons and Cavity Modes in the FIR Range, Jorge Silva and M. I. Vasilevskiy, ICTON2018 Proceedings, IEEE IEEEXplore Digital Library (2018), https://doi.org/10.1109/ICTON.2018.8473813; http://hdl.handle.net/1822/57752

Optimal Control of Irrigation with Field Capacity Modes: Characterizing the Minimal Water Consumption Solution Sofia O. Lopes, Fernando A. C. C. Fontes, Amélia Caldeira and Rui M. S. Pereira, , Proceedings of 13th APCA International Conference on Control and Soft Computing (CONTROLO) (300-305), IEEE IEEEXplore Digital Library (2018); https://doi.org/10.1109/CONTROLO.2018.8514518; http://hdl.handle.net/1822/57738

Arylthienyl-vinyl-benzothiazoles as efficient second harmonic generators (SHG) for nonlinear optics R. M. F. Batista, S. P. G. Costa, M. Belsley and M. M. M. Raposo, , Proceedings of the 22nd International Electronic Conference on Synthetic Organic Chemistry, Sciforum Electronic Conferences Series, https://doi.org/10.3390/ecsoc-22-05702; http://hdl.handle.net/1822/57325 (with CQUM).

6.2.4. Conference Presentations

6.2.4.1. Invited talks delivered at Conferences (International/National)

International

Nuno M. R. Peres, Channel Plasmons and Quantum Plasmonics in Graphene, Workshop on the interaction of light with quantum and topological materials, Barcelona, Spain, 20-22 June 2018.

Nuno M. R. Peres, Plasmonics with graphene, International Conference on Nanomaterials Science and Mechanical Engineering, Aveiro, Portugal, 16-18 July 2018.

Pedro Alpuim, Biosensing with Graphene Electronic Devices, Nano-TN 2018: Nano-Materials: Theory and Experiments, Marrakech, Morocco, 25-28 February 2018.

Pedro Alpuim, Highly target-specific graphene devices for biomedical applications, NanoPT2018 International Conference, Lisbon, Portugal, 7-9 February 2018.

Elisabete M. S. Castanheira, Ana Rita O. Rodrigues, Beatriz D. Cardoso, B. G. Almeida, M.-J. R. P. Queiroz, A. M. Pereira, J. P. Araújo and Paulo J. G. Coutinho, Magnetoliposomes as nanocarriers for fluorescent potential antitumor drugs, 6th Iberian Meeting on Photochemistry, Aveiro, Portugal, 12-14 September 2018.

Ricardo Mendes Ribeiro, DFT calculations in 2D materials, Workshop on Field Theory and Condensed Matter Physics, Braga, Portugal, 19-20 April 2018.

M. Elisabete C. D. Real Oliveira, R. Mendes, T. Soares, E. Fernandes, M. Fátima Cerqueira, P. Alpuim, R. Machado and M. Lúcio, Graphene oxide quantum dots: optical and physical-chemical properties applied to drug delivery, 3rd International Caparica Conference on Chromogenic and Emissive Materials (IC3EM), Caparica, Portugal, 3-6 September 2018.

Jorge Silva and Mikhail Vasilevskiy, Tamm Polaritons and Cavity Modes in the FIR Range, 20th International Conference on Transparent Optical Networks (ICTON 2018), Bucharest, Romania, 1-5 July 2018.

A. S. Vasin, F. Oliveira, M. F. Cerqueira, Joerg Schulze and M. I. Vasilevskiy, Structural and vibrational properties of Sn_xGe_{1-x}: modelling and experiments, VII Conference on Physical and Physico-chemical Foundations of Ion Implantation, Nizhniy Novgorod, Russia, 7-9 October 2018.

M. Vasilevskiy, "Influence of graphene on the light absorption and emission properties of neighbouring nanoparticles", II International Conference on Photonic Colloidal Nanostructures: Synthesis, Properties, and Applications (PCNSPA 2018), Saint Petersburg, Russia, June 4-8, 2018

6.2.4.2. Contributed talks delivered at Conferences (International/National)

International

Magnetoliposomes based on manganese ferrite/gold nanoparticles for applications in cancer therapy, Ana Rita O. Rodrigues, Joana O. G. Matos, Maria-João R. P. Queiroz, B. G. Almeida, J. P. Araújo, Elisabete M. S. Castanheira and Paulo J. G. Coutinho, PCNSPA 2018 – International Conference on Photonic Colloidal Nanostructures: Synthesis, Properties and Applications, Saint Petersburg, Russia, 4-8 June 2018.

Lab-on-a-chip platform based on graphene electrolyte-gated field-effect transistors for protein and DNA sensing, P. Alpuim, E. Fernandes, J. R. Guerreiro, R. Campos, P. D. Cabral, C. Abreu, M. Martins, F. Cerqueira and J. Borme, Biosensors 2018, Miami, USA, 12-15 June 2018.

Photodetector based on CVD grown 2D material Van-der-Waals heterostructure, B. Sompalle, C. D. Liao, J. Borme, V. Saxena, F. Cerqueira, S. Sadewasser and P. Alpuim, European Graphene Forum 2018, Venice, Italy, 23-25 October 2018.

Lab-on-a-chip DNA sensor based on graphene electrolyte-gated feld-effect transistors, J. Borme, R. Campos, J. Rafaela Guerreiro, P.D. Cabral, C. Abreu, M. Martins and P. Alpuim, GraphIN 2018, Bilbao, Spain, 13-15 March 2018.

Functionalization of single-layer graphene transistors for immunoassays, P. D. Cabral, E. Fernandes, M. F. Cerqueira, O. Bondarchuck, D. Y. Petrovykh, J. Borme and P. Alpuim, Nanomedicine International Conference and Exhibition 2018, Venice, Italy, 23-25 October 2018.

Lab-on-a-chip platform for detection of DNA hybridization based on graphene field-effect transistors, J. Borme, R. Campos, J. Rafaela Guerreiro, P. D. Cabral, C. Abreu, M. Martins and P. Alpuim, Graphene 2018, Dresden, Germany, 26-29 June 2018.

Effects of strain on the Raman scattering and X-ray diffraction in Ge-Sn epilayers, F. Oliveira, A. S. Vasin, M.F. Cerqueira, E. Alves, S. Magalhães, J. Schulze and M. I. Vasilevskiy, E-MRS Spring Meeting 2018, Strasbourg, France.

Graphene nano-ribbons for molecular sensing, André Souto, Nuno Peres and Mikhail Vasilevskiy, TERAMETANANO 3 – Terahertz Emission, Metamaterials and Nanophotonics, Uxmal, Mexico, 25-29 March 2018.

Nanosystems as biomimetic interfaces: a new strategy to predict drug candidate biophysical profile, M. Lúcio, E. Fernandes, S. Benfeito, F. Cagide, F. Borges and M. Elisabete C. D. Real Oliveira, ImagineNano2018, Bilbao, Spain, 13-15 March 2018.

An innovative nanocarrier for neuroprotection, M. Elisabete C. D. Real Oliveira, T. B. Soares, J. P. Capela, A. C. P. Dias, M. L. Bastos, F. Carvalho and M. Lúcio, ImagineNano2018, Bilbao, Spain, 13-15 March 2018.

Challenges on the development of nanotherapeutics: biophysical studies to guide formulation development, M. Lúcio, E. Fernandes, T. B. Soares, H. Gonçalves and M. E. C. D. Real Oliveira, Nanotech France 2018 International Conference, Paris, France, 26-28 June 2018.

Curcumin ADMET analysis by interaction studies with mimetic models of biointerfaces: Combined in vitro spectroscopy and in silico studies, M. Lúcio, T. B. Soares, A. C. P. Dias and M. Elisabete C. D. Real Oliveira, 3rd International Caparica Conference on Chromogenic and Emissive Materials (IC3EM), Caparica, Portugal, 3-6 September 2018.

Gd5(Si,Ge)4 nanoparticles produced by pulsed laser deposition, V. Andrade, A. Pereira, J. Araújo, N. R. Checca, M. Reis, J. H. Belo and B. G. Almeida, Intermag2018 Conference, Singapore, 23-27 April 2018.

Very high-order accurate finite volume scheme for the convection-diffusion equation with general boundary conditions on arbitrary curved boundaries, R. Costa, J. M. Nóbrega, S. Clain, G. J. Machado and R. Loubère, SHARK-FV 2018 - Sharing Higher-order Advanced Research Know-how on Finite Volume workshop, Póvoa de Varzim, Portugal, 21-25 May 2018.

National

A Nondegenerate version of the Maximum Principle for State-Constrained Nonholonomic Systems, M. de R. de Pinho, M. M. A. Ferreira, F. A. C. C. Fontes and S. O. Lopes, EPCO 2018 - Portuguese Meeting on Optimal Control, Coimbra, Portugal, 18 June 2018.

Fluorescent graphene oxide quantum dots as traceable, pH sensitive nanocarriers for an anticancer drug, M. Elisabete C. D. Real Oliveira, T. B. Soares, E. Fernandes, R. Mendes and M. Lúcio, 6PYCheM – 6th Portuguese Young Chemists Meeting, Setúbal, Portugal, 15-18 May 2018.

Ferroelectric phenanthrene nanofibers by electrospinning, J. M. Silva, E. de Matos Gomes, A. G. Rolo, B. G. Almeida, Fisica2018 – 21ª Conferência Nacional de Física / 28º Encontro Ibérico para o Ensino da Física, Covilhã, Portugal, 30 August – 1 September 2018.

Thriving narrow band gap ferroelectric oxides: Bi2ZnTiO6 thin films deposited by rf sputtering, F. G. Figueiras, J. R. A. Fernandes, J. P. B. da Silva, D. O. Alikin, E. C. Queirós, M. Belsley, C. R. Bernardo, Y. Romaguera-Barcelay, A. Wrzesińska, B. Almeida, P. B. Tavares, A. L. Kholkin, J. A. Moreira, A. Almeida, Fisica2018 – 21ª Conferência Nacional de Física / 28º Encontro Ibérico para o Ensino da Física, Covilhã, Portugal, 30 August – 1 September 2018.

6.2.5. 6.1.5 National/International Patents

PCT International Application (PCT/IB2018/055588; 26 July 2018)
Terrestrial vehicle range finder device and operation method thereof
Inventors: Annemarie HOLLECZEK, André ANTUNES DE CARVALHO ALBUQUERQUE, Eduardo Jorge NUNES PEREIRA, Alexandre CORREIA, Pedro CALDELAS, Ângela RODRIGUES, Hélder Xavier PEREIRA PEIXOTO.
Applicants: BOSCH CAR MULTIMEDIA PORTUGAL S.A., UNIVERSIDADE DO MINHO.

PCT International Application (PCT/IB2018/055345; 18 July 2018)
Artificial eye for calibration of an eye-tracker, eye tracking calibration system and method thereof
Inventors: Flávio Pedro GONÇALVES FERNANDES FERREIRA, António Filipe TEIXEIRA MACEDO, Isabel Maria FERREIRA MARQUES, Marco António NEVES SOUSA, Helder Tiago CORREIA, Eduardo Jorge NUNES PEREIRA, Boris Paul JEAN BRET.
Applicants: BOSCH CAR MULTIMEDIA PORTUGAL S.A., UNIVERSIDADE DO MINHO.

PCT International Application (PCT/XX2018/XXXXXX; 11 June 2018)
Adaptive filter module
Inventors: Pedro CALDELAS, André ANTUNES DE CARVALHO ALBUQUERQUE, Alexandre CORREIA, Annemarie HOLLECZEK, Nico HEUSSNER, Timo KNECHT, Eduardo Jorge NUNES PEREIRA.
Applicants: BOSCH CAR MULTIMEDIA PORTUGAL S.A., UNIVERSIDADE DO MINHO.

6.2.6. Supervision of Research Students

6.2.6.1. PhD projects completed in 2018

Author	Supervisor	Title	Situation
André Chaves	Nuno M. R. Peres	Fotónica de heteroestruturas de grafeno e outros materiais bidimensionais	MAP-FIS PhD Program, ECUM; concluded.
Ana Rita Oliveira Rodrigues	Elisabete M. S. Castanheira Coutinho, Paulo J. G. Coutinho	Magnetoliposomes based on nickel/silica and ferrite nanoparticles as nanocarriers for potential antitumor drugs	MAP-FIS PhD Program, ECUM; concluded 11.jan.2018
George Luiz Machado Junior	Pedro Alpuim, Jérôme Borme (INL)	Microfabricação de transístores de efeito de campo de grafeno para aplicações em biossensores	Materials Engineering Doctoral Prog., EEUM. concluded 20.july 2018
Filipe André Peixoto Oliveira	Mikhail Vasilevskiy; Maria de Fátima Cerqueira; Jorg Schulze	Raman Spectroscopy Studies of Sn_xGe_{1-x} and ZnO:Mn Semiconductor Solid Solutions	MAP-FIS PhD Program, ECUM; concluded in June 2018.

6.2.6.2. PhD projects in progress

Author	Supervisor	Title	Situation
João Faria	José Luís Carvalho Martins Alves (DEM) and Eduardo Jorge Nunes Pereira	High accuracy positioning of LiDAR optical system with the request to ensure system's accuracy over lifetime	MIT-Portugal PhD Programme
Balaji Sompalle	Pedro Alpuim	Fabrication of a photodetector based on 2D vertical Van der Waals heterostructures	MAP-FIS PhD Program, ECUM, since October 2015
Patrícia Daniela Cabral da Silva	Pedro Alpuim, Elisabete Fernandes (INL)	Immuno-field-effect transistor platforms based on 2D materials for early detection of biomarkers of ischemic stroke	MAP-FIS PhD Program, ECUM, since September 2017
Ramya Gummadi	Sascha Sadewasser (INL), Pedro Alpuim	Optoelectronic Characterization of Chalcogenide Solar Cells and 2D Materials	MAP-FIS PhD Program, ECUM, since March 2017
Catarina Abreu	Steve Cowlan (Swansea); Pedro Alpuim, Inês Pinto (INL)	Graphene EGFET Sensors for Enhanced In Vitro Fertilisation Outcomes and Gynaecological Cancer Detection	PhD in Health and Medical Studies, Swansea University Medical School, since January 2017
Hugo Manuel Castro Gonçalves	Michael Belsley	Unusual photonic properties of doped nano-structured polymeric fibers	MAP-Fis PhD Programme, ECUM
César Rui Bernardo	Michael Belsley, Mikhail Vasilevskiy	Energy transfer dynamics and light-harvesting in Quantum Dots structures	MAP-Fis PhD Programme, ECUM

Beatriz Dias Cardoso	Elisabete M. S. C. Coutinho, Senentxu Lanceros-Méndez, Vanessa Cardoso	Microfluidic evaluation of drug-loaded magnetoliposomes as multifunctional platforms for advanced cell therapies	PhD Program in Materials Engineering, UM; since October 2018
Gonçalo Catarina	Joaquín Rossier (INL); Nuno M. R. Peres (CFUM)	*To be defined*	MAP-Fis PhD Programme, ECUM
Danilo Pedrelli	Danilo Alves (University of Pará, Brazil); Nuno M. R. Peres (CFUM)	*To be defined*	Osst-graduation Univ. do Pará / MAP-FIS Prog.- ECUM
Ícaro Jael Mendonça Moura	Ricardo Mendes Ribeiro	Estudo de heteroestruturas de materiais bidimensionais	MAP-Fis PhD Programme, ECUM
Andreia Marina de Sousa Almeida	Bruno Sarmento (i3S); Marlene Lúcio; S. Schwartz Navarro (Vall d'Hebron Inst. de Recerca - VHIR)	Mucoadhesive camptothecin polymeric micelles as nanodelivery systems for oral chemotherapy to treat colorectal cancer	PhD programme in Biomedical Sciences, Institute of Biomedical Sciences Abel Salazar, University of Porto
Nuno Miguel Teles Oliveira	G. Smirnov	Complexidade de métodos de ponto interior aplicados a problemas de otimização de dimensão infinita	Pdh in sciences – (Math)

6.2.6.3. MSc projects completed in 2018

Author	Supervisor	Title	Situation
Beatriz Dias Cardoso	Elisabete M. S. Castanheira Coutinho, Paulo J. G. Coutinho	Magnetolipossomas baseados em nanopartículas de ferrite de magnésio e mistas para aumento do potencial da curcumina na terapia do cancro	MSc. in Biophysics and Bionanosystems, ECUM; concluded: March 2018
Daniela Sofia Marques Pereira	Elisabete M. S. Castanheira Coutinho	Nanotransportadores magnéticos de fármacos para aplicação terapêutica no cancro da mama	MSc. in Biophysics and Bionanosystems, ECUM; concluded: April 2018
Daniela Ferreira Gomes	Paulo J. G. Coutinho, Teresa Castelo-Grande (FEUP)	Magnetolipossomas com resposta magnética controlada para aplicações biomédicas	MSc. in Biophysics and Bionanosystems, ECUM; concluded: April 2018
Celso Joel Oliveira Ferreira	Bruno F. B. Silva (INL), Maria Elisabete Oliveira	Microfluidic methods for the controlled preparation of soft self-assembled nanocarriers for drug delivery	MSc. in Biophysics and Bionanosystems, ECUM; concluded: Dec. 2018
Diana Isabela Faria Meira	Joel Borges, Ana Paula Sampaio (CBMA)	Desenvolvimento de biossensores, baseados em filmes finos constituídos por nanopartículas de ouro, para identificação de toxinas	MSc. in Biophysics and Bionanosystems, ECUM; concluded: Dec. 2018

João Miguel Fernandes Araújo	Paulo J. G. Coutinho, Óscar Ramos (CEB)	Behaviour of lactoferrin nanohydrogels incorporating curcumin as model compound into food simulants	MSc. in Biophysics and Bionanosystems, ECUM; concluded: Nov. 2018
Maria Lúcia Miranda Gomes	Paulo J. G. Coutinho, Cacilda Moura	SERS nanotags based on gold or silver nanoparticles decorating superparamagnetic calcium ferrite nanoparticles	MSc. in Biophysics and Bionanosystems, ECUM; concluded: July 2018
Maria Manuela Carvalho Proença	Joel Borges, Ana Paula Sampaio (CBMA)	Development of nanoplasmonic thin films for gaseous molecules detection	MSc. in Biophysics and Bionanosystems, ECUM; concluded: Jan. 2018
Patrícia Alexandra Pereira da Silva	Joel Borges, A. Paula Sampaio (CBMA)	Desenvolvimento de filmes finos transparentes de ZnO com propriedades antimicrobianas	MSc. in Biophysics and Bionanosystems, ECUM; concluded: Dec. 2018
Pedro Manuel Lima da Silva	Jana Nieder (INL), Maria Elisabete Oliveira	Bionanostructures for intracellular temperature sensing during hyperthermia cancer treatments	MSc. in Biophysics and Bionanosystems, ECUM; concluded: Dec. 2018
Tatiana Jorge Torres Vilhena Ventura	Marlene Lúcio, Teresa Viseu	Development of nanostructured delivery scaffolds for doxorubicin *via* electrospinning	MSc. in Biophysics and Bionanosystems, ECUM; concluded: March 2018
Vitor Sérgio Fernandes Gonçalves	Filipe Vaz, Teresa Matamá (CBMA)	Estudo das interações de filmes finos intermetálicos do tipo Ti-Me (Me = Ag, Au, Al, Cu) com sistemas biológicos, aplicados à funcionalização de elétrodos/sensores do tipo polimérico para dispositivos biomédicos	MSc. in Biophysics and Bionanosystems, ECUM; concluded: March 2018
Sara Daniela Pimentel Guimarães	Paulo J. G. Coutinho, Elisabete M. S. Castanheira Coutinho	Fotodegradação de efluentes usando perovskites mistas de $(Zn,Co)TiO_3$ dopadas com flúor	MSc. in Environmental Sciences and Technologies, ECUM; concluded: July 2018
Ricardo Jorge Cunha Fernandes	Paulo J. G. Coutinho, Elisabete M. S. Castanheira Coutinho	Fotodegradação de efluentes utilizando nanopartículas compósitas de ferrite de zinco ou zinco/cálcio e prata com cobertura de surfactante	MSc. in Environmental Sciences and Technologies, ECUM; concluded: Dec. 2018
Marina Alves	Sascha Sadewasser (INL), Pedro Alpuim	$Cu(In,Ga)Se_2$ thin film solar cells by magnetron sputtering	MSc. in Environmental Sciences and Technologies, ECUM; concluded: Nov. 2018
Mariana Isabel Cunha Nogueira Almeida Monteiro	Elisabete M. S. Castanheira Coutinho, A. Gil Fortes (CQUM)	Plant extracts: isolation, characterization, encapsulation in lipid nanosystems and cytotoxicity in AGS cells	MSc. in Applied Biochemistry, ECUM; concluded: Dec. 2018

João Pedro Matias da Silva	Bernardo Almeida, Etelvina Matos Gomes	Nanofibras de materiais ferroelétricos por electrospinning	Integrated Master in Materials Eng. (EEUM)
Rui Mesquita	Graça Soares (DET-EEUM), Marlene Lúcio	Development and optimization of biofunctional textiles with anti-inflammatory properties	MSc. in Micro and Nanotechnologies (EEUM)
Jorge Silva	Mikhail Vasilevskiy	Polaritons in Multilayer Semiconductor Structures	MSc. in Physics, ECUM; concluded: January 2018
Sharath Kumar Manjeshwar Sathyanath	Anabela Gomes Rolo (CFUM); Leonard Deepak Francis (INL)	Electron Microscopy and Spectroscopy Study of Modified Titanate Nanowires and Titanate Nanotubes	MSc. in Physics, ECUM; concluded: July 2018

6.3 Functional and smart materials and surfaces for advanced applications

6.3.1 Researchers

Principal investigator	Martin Andritschky
Members	Effective members of the Centre - Cacilda Moura - Carlos Tavares - Diego Martinez - José Filipe Vilela Vaz - Francisco Macedo - Joaquim Carneiro - Luís Cunha - Luís Rebouta - Luis Marques - Manuel Costa - Maria J. M. Gomes - Mário Pereira - Marta Ramos - Martin Andritschky - Sandra Carvalho - Senentxu Mendez - Stanislav Ferdov - Vasco Teixeira Collaborators Staff members with PhD - Jorge Mendes (Polytechnical Institute, Vila do Conde) - Li-Jian Meng (Porto) - Maria Teresa Pitta de Lacerda-Arôso(UM) - Mário Almeida (UM) - Mário Zamith (UM) Post-Doctorate Researchers - Armando Ferreira –SFRH/BPD/102402/2014 (100%) - Carlos Costa –SFRH/BPD/112547/2015 (100%) - Catalina Mansilla Sanchez - SFRH/BPD/105068/2014 (100%) - Cristiana Alves - ERA-SIINN/0004/2013 - Clarisse Ribeiro –- SFRH/BPD/90870/2012 (100%) - Filipe Fernandes - SFRH/BPD/116334/2016 (100%) - José Pedro Basto da Silva (Post-Doc FCT: SFRH/BPD/92896/2013) - Margarida Fernandes - SFRH/BPD/121464/2016 (70%) - Paulo Pedrosa - UMINHO/BPD/26/2017 (100%) - Pedro Costa –SFRH/BPD/110914/2015 (50%) - Pedro Libanio Martins–SFRH/BPD/96227/2013 (100%) - Sebastian Calderon Velasco – (UMINHO/BPD/11/2016) (100%)

- Sergey Pyrlin – European project TheLink (UMINHO/BGCT/08/2016) (100%)
- Vanessa Cardoso – SFRH/BPD/98109/2013 (30&)
- Vitor Correia – SFRH/BPD/97739/2013 (50%)
- Isabel Carvalho –- Projeto nº 006684 - Minho-BIO/04469 (50%) PTDC/CTM-NAN/4242/2014

Integrated PhD students

- Pedro Martins- PhD in Sciences ended 30-11-2018
- Cláudia de Jesus Ribeiro Lopes – Science Phd Program – FCT Fellowship ended 21/12/2018
- Juliana Dias - Science Phd Program – ended 22/02/2018
- Abbas M.k. AL-Rjoub Map -Fis Phd Program
- Veniero Lenzi PhD Sciences
- Marco Pires M. S. Rodrigues Map-Fis– FCT Fellowship
- Manuela Carvalho Proença MAPFIS doctoral program
- Ana Catarina Branco Lima PhD Material Engeneering
- Bruna Gonçalves PhD Material Engeneering
- António Castro PhD Surface Protection Engeneering
- Edgar Carneiro PhD Surface Protection Engeneering
- Diogo Cavaleiro PhD Surface Protection Engeneering
- Luísa Fialho PhD Surface Protection Engeneering
- Diogo Ramos PhD Surface Protection Engeneering
- Hugo Salazar Map -Fis Phd Program – FCT Fellowship
- Filipe da Costa Correia PhD Material Engeneering
- Marta Adriana Félix Forte (Programa Doutoral em Materiais e Processamento Avançados – AdvaMTech)
- Juliana Filipa Gouveia Marques PhD Material Engeneering
- Catarina Isabel da Silva Oliveira PhD Program in Materials Engineering
- Jivago Serrado Gomes Aguiar Nunes; PhD Material Engeneering
- Juliana Alice Ferreira Oliveira PhD Material Engeneering
- Sylvie de Oliveira Ribeiro PhD Material Engeneering
- Teresa Almeida PhD Material Engeneering
- Tiago Marinho PhD Material Engeneering

PhD students – Members of other R&D Centres, co-supervised by CFUM reseachers and Part-Time Ph-D students

- Pablo Andres General Toro (Dout. Artes - Conservação e Restauro)
- Iran Segundo Project Fellowship (SFRH/BD/137421/2018
- Salmon Landi Science Phd Program – CAPES Fellowship
- Rita Ferreira MIT Portugal PhD Program
- Simone Rodrigues AdvaMTech PhD program
- Célia Ribeiro Phd Education Science
- Nelson Pereira – Phd Engineering
- Bogdan Postolnyi - Phd Engineering
- Isabel Lopes – PhD AdvaMtech
- João Teixeira - PhD Material Engeneering

Other research students

	- Carlos Costa; Title: Novel nanomaterials and consepts for advanded re-chargable lithium-ion batteries (Ongoing); FCT, SFRH/BPD/112547/2015 - Catarina Isabel da Silva Oliveira FCT Project - Joana Ribeiro, Research Assistant w/ fellowship - João Pereira; TecMinho Project - Marco Silva; FCT Project - Paulo Salvador, Research Assistant w/ fellowship - Tiago David Gomes, Research Assistant w/ fellowship - Hafsae Lamsaf – FCT Project - Vipin Richhariya – FCT Project - José David Castro – MIT-FCT Project - Kira Gonzalez Gala – FCT Project

6.3.2 Brief description of the scientific work carried out within the Research Line in 2018

In 2018the focus of the work was directed to the developmet of materials, mainly multiple alloy oxides and nitrides and the study of the electrical, magnetic optical and othe physical properties of those materials having in mind applications like sensors, actuators and other kind of functionalization. One major technique for the material development was thin film deposition by magnetron sputtering and laser ablation. A second , low cost, technique applied was direct ink jet printing. Other techniques techniques mainly tried to functionalize the materials also by nano and micro structuring. Examples of the material development are and their applications are:

1. Lead free ferroelectrics: Development of lead-free ferroelectric ceramics and thin films based on x(Ba,Ca)TiO3-(1-x)(Ba,Zr)TiO3 (with x= 0.4, 0.5 or 0.6) with the aim to exhibit the ferroelectric and dielectric properties equivalent of PbZrTiO3 (PZT).
2. transparent thermoelectric thin films for photovoltaic and touch displays applications
3. solar-activated microcapsules for controlled release of substances
4. Antibacterial coatings: Zr-C-N-Ag, DLC+Ag, AgO,
5. Antimicrobial bimetallic clusters – ZnO
6. free standing metal nanoparticles on a substrate and/or embedded in transparent dielectric thin films (SiC, Si3N4, ZrO2, Al2O3, HfO2, HfAlO etc) in order to tailor the final properties for chemical, bio-sensor and photovoltaic applications.
7. selective absorption of solar radiation for high temperature applications with structures based on nitride/oxynitride or ceramic/metal composites.
8. Study and production of functionalized textiles substrates to promote de-pollution of conventional industrial effluents, general liquid media and also soils contaminated with petroleum derivatives. According the type of application, the bare textile substrates are selectively functionalized with SiO2-TiO2-HY composites or TiO2-reduced graphene oxide.
9. Synthesis of new materials for cathodes and anodes of lithium-based batteries.
10. Optimized synthesis of LiFePO4 - a high performance cathode for lithium-based batteries.
11. innovative solutions to control dynamically the temperature of the injection molding process of polymeric parts using thin films (for temperature and pressure control) and additive manufacturing (for the cooling system). temperature and pressure sensors are being developed in the form of thin films, deposited by magnetron sputtering.

12. For the project Plascoat, the solutions for the metallization of polymers were presented to the beneficiary of the project (Prirev), are they start to be upscaled to the company.
13. Desenvolvimento de materiais multifuncionais para sensores e atuadores, energia e aplicações biomédicas. Especial atenção a materiais piezoelectricos, piezoresistivos e magnetoelectricos na area de sensores; separadores de baterias e "polymer binders" na area da energia; e materiais piezoelectricos e condutores na area biomédica

6.3.3 Future research summary

The future research continues most of the present activities within running projects.
Additionally:
1. Development of multi – functional materials for sensors and actuators , enrgy and biomedical applications with focus on piezoelectric and -resistiv, magnetoeletric materials deposited by printing technologies. For sensors and actuators and batterie components.
2. Development of the work of the M-ERA-NET project ALD4MAX (Atomic Layer Deposition For tailored bottom-top growth of MAX and MXene films),
3. Development of cermets by the co-deposition of the two materials in same magnetron sputtering chamber. In the second, nanoparticles will be first nucleated in a supersaturated gas using a magnetron sputter source operating at a primary vacuum in an auxiliary chamber, and then will be ejected to a main chamber using a differential pumping system, where the ceramic matrix is being deposited
4. Plasmonic nanoparticles for bio-detection: Continuation of the growth and study of novel plasmonic structures with applications in biological and medical science
5. The On-Surf is a mobilisation project involving national companies from different sectors and entities from the SI&I system, comprising a broad consortium around a priority axis of its Internationalization and Innovation agenda - Surface Engineering (SE). It is a cross-cut programme because it seeks to develop and apply surface modification processes that can promote advanced and innovative solutions:(i) in different sectors such as Automotive, Aeronautics, Molds&Tools, Health and Electronics; (ii) that can be aligned with the strategic objectives of the National Clusters: Health Cluster Portugal, ENERGYIN, Engineering &Tooling, Mobinov, Produtech, Tice;(iii) while involving companies positioned throughout the whole value chain, including the surface modifiers, the final solution appliers/end-users.

6.3.4 Publications

6.3.4.1 Regular articles published in ISI/Scopus Journals

A new approach for preparation of metal-containing polyamide/carbon textile laminate composites with tunable electrical conductivity (2018) Oliveira, F., Dencheva, N., Martins, P., Lanceros-Méndez, S., Denchev, Z.Journal of Materials Science, 53 (16), pp. 11444-11459. DOI: 10.1007/s10853-018-2435-9

Advances in Magnetic Nanoparticles for Biomedical Applications (2018) Cardoso, V.F., Francesko, A., Ribeiro, C., Bañobre-López, M., Martins, P., Lanceros-Mendez, S. Advanced Healthcare Materials, 7 (5), art. no. 1700845, . DOI: 10.1002/adhm.201700845

Annealing induced effect on the physical properties of ion-beam sputtered 0.5 Ba(Zr0.2Ti0.8)O-3-0.5 (Ba0.7Ca0.3)TiO3-delta ferroelectric thin films, M. J. S. Oliveira, J.P.B. Silva, K. Veltruska, V. Matolin, K.C. Sekhar, J.A. Moreira, M. Pereira, M.J.M. Gomes, APPLIED SURFACE SCIENCE, 443 (2018) 354-360.DOI: 10.1016/j.apsusc.2018.02.269 http://hdl.handle.net/1822/57402

Antibacterial effect and biocompatibility of a novel nanostructured ZnO-coated gutta-percha cone for improved endodontic treatment, M.J. Alves, L. Grenho, C. Lopes, J. Borges, F. Vaz, I.P. Vaz, M.H. Fernandes, Mater Sci Eng C. 92 (2018) 840–848. doi:10.1016/j.msec.2018.07.045.

Assessment of photocatalytic, superhydrophobic and self-cleaning properties on hot mix asphalts coated with TiO2 and/or ZnO aqueous solutions, Rocha Segundo I., Ferreira C., Freitas E.F., Carneiro J. A. O., Fernandes F., Júnior S. L., Costa M. F. M. Construction and Building Materials 166 (2018) 500–509. (IF: 3.485) DOI:10.1016/j.conbuildmat.2018.01.106, 2018 http://hdl.handle.net/1822/51682

Bombyx mori Silkworm Cocoon Separators for Lithium-Ion Batteries with Superior Safety and Sustainability Adv. Sustainable Syst. Rui F. P. Pereira, Renato Gonçalves, Mariana Fernandes, Carlos M. Costa, Maria M. Silva, Verónica de Zea Bermudez, and Senentxu Lanceros-Mendez2018, 1800098 DOI: 10.1002/adsu.201800098

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6.3.4.2 Books and book chapters

Chapters

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C. Ribeiro, C.M. Costa, P. Martins, V. Correia, S. Lanceros-Mendez, Piezoelectric Polymers and Polymer Composites for Sensors and Actuators
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Book Editing

S. Lanceros-Méndez, C.M. Costa, Printed Batteries: Materials, Technologies and Applications, Wiley, 2018.

6.3.4.3 Conference Proceedings with Pier Review appearing in the ISI Database

Photocatalytic Asphalt Mixtures: Semiconductors' Impact in Skid Resistance and Microtexture, Rocha Segundo I., Freitas E.F., Carneiro J. A. O., Oliveira S. M. B., Costa M. F. M., Landi Jr. S. 2018 Conference of the International Society for Asphalt Pavements (ISAP2018), Fortaleza, Brazil, June 19-21, 2018; http://hdl.handle.net/1822/56099

Properties of CrN thin films deposited in plasma-activated ABS by reactive magnetron sputtering Paulo Pedrosa, Marco S. Rodrigues, Miguel A. Neto, Filipe J. Oliveira, Rui F. Silva, Joel Borges, Margarida Amaral, António Ferreira, Luís H. Godinho, Sandra Carvalho, Filipe Vaz, , Surface Coatings and Technology, 349 (2018) 858-866. Quartile: Q1. Impact factor: IF: 2.906

6.3.5 Conference Presentations

6.3.5.1 Invited talks delivered at Conferences (International/National)

International

S. Lanceros-Mendez et al "Tailoring Electroactive Smart Materials as Suitable Microenvironments for Tissue Engineering Applications"" at the at the International Workshop on Self-Assembly and Hierarchical Materials in Biomedicine: Drug Delivery, Tissue Engineering, Sensing and Safety Issues, Donosti, Spain, 8-10/10/2018.

S. Lanceros-Mendez et al "Smart and Multifunctional Materials for a Better Life" Naukas Pro – Event, 9/10/2019, Bilbao

S. Lanceros-Mendez et al "Suitability of electro and magnetoactive microenvironments for advanced tissue engineering strategies" at the 26th EORS Annual Meeting, 25th – 28th September 2018, Galway, Ireland...

S. Lanceros-Mendez et al Plenary talk "Nanoengineering of organic materials for smart and multifunctional application" at the International Conference on Nanomaterials Science and Mechanical Engineering University of Aveiro, Portugal July 16-18, 2018.

S. Lanceros-Mendez et al "Bioinspired Smart and Multifunctional Materials as a Key Enabling Technology" at the "Bioinspired 3D Structures" meeting at Dublin City University, Dublin, Ireland (31/05/2018).

S. Lanceros-Menedz, et al "Magnetoelectric biomaterials for advanced tissue engineering applications" Intermag 2018 IEEE International Magnetic Conference 26 April 2018

S. Lanceros-Mendez, et al ICONN2018, Wollongong, Australia, on "Improving smart materials applications and Integration by printing technologies"1 February, 2018

P. Martins, S. Lanceros-Mendez "Advanced photocatalytic nanomaterials and immobilization strategies for efficient water remediation", at NPM-3 / PAOT-4 - Porto, in july 14 2018.

V. F. Cardoso. "A new generation of smart gastrointestinal endoscopes and related healthcare biomedical devices – EndoSmart". Foro Transfronterizo de Tecnologías Universitarias, Salamanca, Spain. 26 Setember 2018.

F. Vaz, J. Borges, Hard Transition Metal Oxynitride Thin Films: From Synthesis to Applications. New Horizons in Coatings and Thin Films. International conference on metallurgical coatings and thin films (ICMCTF 2018). USA, 2018.

National

- D. M. Correia, C. Ribeiro, S. Lanceros-Mendez, "(Bio)polymers: main characteristics, applications and challenges", 4th edition of Advanced course in Biopolymers, May 7-18 2018. University of Minho.

Estela O. Carvalho, Daniela M. Correia, Clarisse Ribeiro, Senentxu Lanceros-Méndez, Gabriela Botelho, Development of biodegradable hydrogels loaded with electroactive microspheres for tissue engineering applications. V Encontro em Tecnicas de Caracterizações e Análise Química, Braga, Portugal, 2018.

Solar selective absorber coatings for high temperature applications, L. Rebouta, A. AL-Rjoub, L. G. Vieira, N. P. Barradas, E. Alves, ICPAM-12, Crete, Grece, 22-28 September, 2018

Carlos Tavares - TiO2 Functionalized-Polyurethane Microcapsules for Mosquito Repellency, Carlos J. Tavares, The 3rd International Conference on New Photocatalytic Materials for Environment, Energy and Sustainability (NPM-3) & The 4th International Conference on Photocatalytic and Advanced Oxidation Technologies for the Treatment of Water, Air, Soil and Surfaces (PAOT-4), Almeida Garret Municipal Library, Porto, Portugal, July 10-13, 2018

Sandra Carvalho - Zinc and Zinc-Iron Nanoparticles as Oxygen Scavengers, SurfCoat Korea 2018, The International Conference on Surfaces, Coatings and Interfaces, Incheon, Korea, from the 28th to the 30th March, 2018

Sandra Carvalho - Plenary Talk: Ceramic-Ag nanocomposite coatings produced by magnetron sputtering: effect of Ag nanoparticles on functional properties, CNMAT 2018, XV Congreso Nacionale de Materiales, 1st Iberian Meeting on Materials Science, 4th to the 6th July 2018, Salamanca, Spain.

Sandra Carvalho – Plenary Talk - Microscopy as a tool for solving problems related to nanometric size differentiated phases in thin film technology, INCOMAM18 Congress, 12 – 13 October, 2018, University of Coimbra, Portugal

Magnetron Sputtering as a Tool for Producing Metallic and Bimetallic Multifunctional Nanoparticles, Sebastian Calderon, Isabel Carvalho, Albano Cavaleiro, Sandra Carvalho, Paulo Ferreira. PSE2018, September 17 - 21, 2018, in Garmisch-Partenkirchen, Germany

F. Fernandes, Self-lubricant and multilayered coatings as a solution for high temperature
Applications, XV Congreso Nacional de Materiales – I Iberian Meeting on Materials Science, July 4-6 2018, Salamanca, Spain

F. Fernandes, Low friction and wear resistance thin films for machining operations , 8th International Conference on High Speed Machining and the 3rd Workshop on PVD Coatings for High Speed Cutting Tool (ICHSM&WPCCT 2018), November 22-24th 2018, Guangzhou, China

F. Fernandes, Self-lubricant and multilayered coatings as a solution for machining operations, 16th International Conference on Plasma Surface Engineering - PSE 2018, September 17 to 21th, 2018, Garmisch-Partenkirchen, Germany.

Martin Andritschky, Solar Thermal Collector for large área applications, palestra realizada na INL workshop on SOLAR FUEL PRODUCTION, 29 de Novembro 2018.

6.3.5.2 Contributed talks delivered at Conferences (International/National)

International

M. Proença, J. Borges, M.S. Rodrigues, F. Vaz, Development of Thin Films Composed of Plasmonic Nanoparticles (Au, Ag) Dispersed in an Oxide Matrix, for LSPR (Gas) Sensing. Twenty-Sixth Annual International Conference on Composites/Nano Engineering (ICCE-26). Paris, July 2018.

A. Ferreira, L. Godinho, M. Amaral, PRIREV, Portugal; M. Neto, F. Oliveira, R. Silva, Universidade de Aveiro, Portugal; J. Borges, F. Vaz, "Properties of CrNx thin films deposited in plasma activated polymers by reactive magnetron sputtering", M. Rodrigues, P. Pedrosa, Minho University, Portugal; 45th ICMCTF 2018 - International Conference on Metallurgical Coatings and Thin Films, San Diego, CA, USA April 23 to 27, 2018. Poster.

Multi-layer solar selective absorber coatings based on W/WSiAlNx /WSiAlOyNx/SiAlOx for high temperature applications, L. Rebouta, A. AL-Rjoub, P. Costa, L. G. Vieira, AEM2018, Guilford, England, 10-12 September, 2018

Production of zirconium oxynitride thin films by magnetron sputtering: the quest of breaking the chemical composition restrictions.
D. Martínez-Martinez, C.I. da Silva-Oliveira, C. Mansilla-Sanchez, S. Carvalho, L. Cunha.
16th International Conference on Plasma Surface Engineering (PSE2018), Garmisch-Partenkirchen (Germany). 17-21 September 2018 (Oral).

Post-annealing structural rearrangement of M/CuOx (M=Ag, Au) nanocomposite thin films showing Localized Surface Plasmon Resonance..

D. Martínez-Martinez, M. Proença, J. Borges, M.S. Rodrigues, J.C. Sanchez-Lopez, F. Vaz.
16th International Conference on Plasma Surface Engineering (PSE2018), Garmisch-Partenkirchen (Germany). 17-21 September 2018 (Oral).

Mechanical properties of tough nanocomposites: a computational study by molecular dynamics.
D. Martinez-Martinez, O. Nieto-Faza.
Materials Science Engineering (MSE2018) - European Congress and Exhibition on Advanced Materials and Processes, Darmstadt (Germany). 26-28 September 2018 (Highlight lecture).

Crystallization processes in bicomponent thin film depositions: towards a realistic Kinetic Monte-Carlo simulation.
D. Martinez-Martinez, C. Herdes, I. Vega.
Materials Science Engineering (MSE2018) - European Congress and Exhibition on Advanced Materials and Processes, Darmstadt (Germany). 26-28 September 2018 (Oral).

"Synthesis and X-ray diffraction study of highly siliceous faujasites", Stanislav Ferdov, Nao Tsunoji, Tsuneji Sano, ZMPC2018, comunicação oral apresentada no "International Symposium on Zeolites and Microporous Crystals", Yokohama - Japan, 5-9th August, 2018.

Carlos Tavares - Thin Films for Transparent Thermoelectric Modules, International Conference on Metallurgical Coatings and Thin Films (ICMCTF) 2018, Session Title: Thin Films for Energy-related Applications, April 23-27 2018, San Diego CA, United States.

Rocha Segundo I., Freitas E.F., Carneiro J. A. O., Oliveira S. M. B., Costa M. F. M., Landi Jr. S. Photocatalytic Asphalt Mixtures: Semiconductors' Impact in Skid Resistance and Microtexture, 2018 Conference of the International Society for Asphalt Pavements (ISAP2018), Fortaleza, Brazil, June 19-21, 2018; http://hdl.handle.net/1822/56099 Oral

V Martins, T Rodrigues, MFM Costa, B Cleto, Scientist Girls on-Drones: Growing the Future, 15th International Conference on Hands-on Science - Advancing Science. Improving Education, Costa MF, Dorrío BV, Fernández-Novell JM (Eds.); ISBN 978-84-8158-779-1, Hands-on Science Network, 2018, pp 370 Oral

V Martins, JD Martins, LA Martins, MFM Costa, The Simpsons Looking for a Sky without Light Pollution. 'Scuse Me While I Miss The Sky, 15th International Conference on Hands-on Science - Advancing Science. Improving Education, Costa MF, Dorrío BV, Fernández-Novell JM (Eds.); ISBN 978-84-8158-779-1, Hands-on Science Network, 2018, pp 379 Oral

Rocha Segundo I., Freitas E.F., Carneiro J. A. O., Oliveira S. M. B., Costa M. F. M., Landi Jr. S. "Photocatalytic Asphalt Mixtures: Semiconductors' Impact in Skid Resistance and Microtexture", International Society for Asphalt Pavements (ISAP), 2018. http://hdl.handle.net/1822/56099

Manuel F. M. Costa, The Aurora. Wonder and Science, 15th International Conference on Hands-on Science - Advancing Science. Improving Education, Costa MF, Dorrío BV, Fernández-Novell JM (Eds.); ISBN 978-84-8158-779-1, Hands-on Science Network, 2018, pp 392 Poster

Manuel F. M. Costa, Erasmus+ VOYAGE, Workshop Cooperação Internacional - ERASMUS - desafios e perspetivas, Universidade do Minho, 7 de fevereiro 2018 Oral http://hdl.handle.net/1822/50194

Manuel F. M. Costa, L. Mengoni, S. Teixeira, C. Mourai, Bridging Universities and Enterprises to Improve Graduates Employability. The Voyage Erasmus+project, 5th Teaching and Education Conference, Amsterdam, June 19-22, 2018 Oral

Manuel F. M. Costa, Introducing Holography to Optometry Students, 11th International Symposium of Display Holography, ISDH2018, Aveiro, June 25-29, 2018 Oral

Manuel F. M. Costa, Bridging Science Technology and Engineering Education. The Hands-on Science Network, 3rd International Conference of the Portuguese Society for Engineering Education (CISPEE 2018), Aveiro, June 27-29, 2019 Oral

Manuel F. M. Costa, Antonio Mario Almeida, Luis Cunha and Cacilda Moura, Improving the employability of graduates by strengthening the relationships between higher education and enterprises, 3rd International Conference of the Portuguese Society for Engineering Education (CISPEE 2018), June 27-29, 2019 Oral

Manuel F. M. Costa, Strengthening the Relations Between Higher Education Institutions and Enterprises. The Erasmus+ International Cooperation Project Voyage, EDULEARN18, Palma de Maiorca, Spain, July 2-5, 2018 Oral

Manuel F. M. Costa, Iran Gomes da Rocha Segundo, Torres H, J. Carneiro, Freitas E. F., Rugometric evaluation of photocatalytic asphalt pavement. Filtering and separation of roughness regimes, XII Reunión Nacional de Óptica, RNO2018, Castellon, Spain, July 3-6, 2018 Poster

Manuel F. M. Costa, A. Mário Almeida, L. Cunha, S. Teixeira, C. Moura, Luisa Mengoni, Database and information sharing online platform to bridge higher education institutions graduates and enterprises. The Erasmus+ Voyage international cooperation project, 7th International Conference on Knowledge and Education Technology, ICKET2018, Edinburgh, August 22-24, 2018. Oral Best communication

Functional characterization of hybrid surfaces: dimple-shaped anodized al alloy surfaces coated with WS-CF sputtered coatings, S. P. Rodrigues, S. Carvalho and A. Cavaleiro, 16th International Conference on Plasma Surface Engineering (PSE 2018), Garmisch-Partenkirchen, Germany, 2018.

Tribological and wettability evaluation of magnetron sputtered WS-C/F coatings, S. P. Rodrigues, S. Carvalho and A. Cavaleiro, 45th International Conference on Metallurgical Coatings and Thin Films (ICMCTF 2018), San Diego (CA), USA, 2018.

Magnetron sputtering as tool to develop antimicrobial coatings for biomedical devices, I. Carvalho, M. Henriques, S. Carvalho, AMiCI Conference, Zagreb, Croatia, 2-3 October 2018

Development of bioactive tantalum oxide surface, L. Fialho, C. F. Almeida Alves, S. Carvalho, XV Congreso Nacional de Materiales e 1st Iberian Meeting on Materials Science, Salamanca, Espanha (CNMAT 2018), 4-6 July, Salamanca, Spain.

Influence of Ag content on the mechanical, structural and thermal properties of TiSiN(Ag) thin films deposited by HiPIMS, D. Cavaleiro, S. Carvalho, A. Cavaleiro, F. Fernandes, XV Congreso Nacional de Materiales e 1st Iberian Meeting on Materials Science, Salamanca, Espanha (CNMAT 2018), 4-6 July, Salamanca, Spain.

Self-lubricating TiSiN(Ag) films deposited by HiPIMS for machining operations: Effect of Ag content on the mechanical properties, thermal stability and oxidation resistance, D. Cavaleiro, S. Carvalho, A. Cavaleiro, F. Fernandes, 8th International Conference on High Speed Machining and 3rd Workshop on PVD Coatings for High Speed Cutting Tool (ICHSM&WPCCT 2018), 22-24 November, Guangzhou, China

J. Oliveira, S. Calderon V., P. Sampaio, P. J. Ferreira, S. Carvalho, Incorporation of nanoparticles on nanostructured surfaces, CNMAT 2018, XV Congreso Nacionale de Materiales, 1st Iberian Meeting on Materials Science, 4th to the 6th July 2018, Salamanca, Spain.

I. Carvalho, S. Calderon V., P. J. Ferreira, A. Cavaleiro, S. Carvalho, Nanoparticles deposition by plasma gas condensation process, CIMTEC 2018, 14th International Ceramics Congress, Perugia, Italy, 4th to 8th June 2018.

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Revisiting the nanocomposite structure of sputtered TiSiN films, F. Fernandes, Calderon, Ferreira, A.Cavaleiro,Proceedings of the 45rd International Conference on Metallurgical Coatings and Thin Films – ICMCTF 2018, April 23-27th, San Diego, USA.

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An experimental / theoretical study on the crystal structure and the elastic properties of Ta1-xOx coatings, C. F. Almeida Alves, L. Marques, S. Calderon V., P. J. Ferreira, D. Shneider, A. Cavaleiro and S. Carvalho, PSE2018 – 16th International Conference on Plasma Surface Engineering, Garmisch-Partenkirchen, Germany, September 2018

Observing Zn-Fe Galvanic Oxidation at Nanoscale by Aberration-Corrected STEM, S. Calderon V. I. Carvalho, A. Cavaleiro, S. Carvalho, P. J. Ferreira, ICM19, 9-14 September 2018, Sydney.

Polymer-based magnetoelectric materials: from fundamentals to applications. P. Martins and S. Lanceros-Mendez; IEEE International Magnetics Conference in Asia, INTERMAG 2018, April 23th to 27th, Singapore

Cristian Mendes at al "Electromechanical properties of UV-curable piezoresistive composites for sensor applications" ANM 2018, 11th International conference on Advanced Nano Materials 18-20/07/2018 Aveiro, Portugal.

Ander Reizabal, R. Brito-Pereira, C. M. Costa, Leyre Pérez, Jose-Luis Vilas, Senentxu Lanceros-Mendez, Silk fibroin films reinforced by carbon nanotubes, a new generation of piezoresistive sensors based natural polymers, ANM 2018, 11th International conference on Advanced Nano Materials 18-20/07/2018 Aveiro, Portugal.

P. Costa et al. European Materials Research Society (E-MRS 2018 Springer Meeting) – 18-22 June, Strasbourg, France. Oral presentation entitled "Tailoring polymer-based materials with electromechancial properties for sensors applications"

C. Garcia-Astrain, et al "Influence of carbonaceous nanofiller type and content on the piezoresistive response of polymer based composites for sensing applications", European Materials Research Society (E-MRS 2018 Springer Meeting) – 18-22 June, Strasbourg, France.

Silk-based materials as suitable separators for lithium ion battery, R. F. P. Pereira, R. Brito-Pereira, R. Gonçalves, M. Fernandes, C. M. Costa, M. M. Silva, S. Lanceros-Méndez, V. de Zea Bermudez, 16th International Symposium on Polymer Electrolytes (ISPE-16)" 24-29 June, 2018, Yokohama (Japan)

V. F. Cardoso, C. Ribeiro, S. Lanceros-Méndez. "Magnetic Bioreactor - BioMag". Foro Transfronterizo de Tecnologías Universitarias, Salamanca, Spain. 26 Setember 2018.

- C. Ribeiro et al In-vivo demonstration of the suitability of piezoelectric stimuli for tissue engineering. EORS 2018, Galway, Ireland. 25 to 28 September 2018.

"Magnetoelectric Polymer composite microenvironments for tissue engineering applications", N. Castro, S. Ribeiro, C. Ribeiro, V. Correia, P. Martins and .S Lanceros-Mendez, ECNP 2018 – 6th Young Polymer Scientist Conference, San Sebastian, October 2018

da Costa A., Sencadas V., Lanceros-Méndez S., Gomes A.C., Rodríguez-Cabello J.C., Casal M., Machado R. Genetically engineered protein-based materials with broad antimicrobial activity for biomedical applications. 256th ACS National Meeting & Exposition, Boston, MA, USA, August 19-23, 2018.

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- C. M. Costa, D. Miranda, R. Gonçalves, M.M. Silva, S. Lanceros-Méndez, Estudo De Novos Eletrólitos Sólidos Para Baterias De Ião-Lítio, Física 2018, 30 de Agosto a 1 de Setembro, Covilhã

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National

Photocatalytic degradation of Rhodamine B dye using SiO2-TiO2nano supported in HY zeolite on the cotton textiles", Salmon Landi Jr., Joaquim Carneiro, Pier Parpot, Maurício Fonseca, Isabel Neves. Materiais 2017, 09-12 April 2017, Aveiro (Portugal).

Manuel Filipe Costa, SPOF- Optics and Photonics in Portugal, 2018 SPOF' Summer School "Topics in Optics for Space & Ground Based Astronomical Instruments", Universidade de Lisboa, Portugal, 10-11 de setembro de 2018. Oral

6.3.6 National/international Patents

"Beschichtung Interkonnektorplatte" ATA 50810/2018, K. Zorn, M. Hiller, M. Andritschky, Austria 2018

6.3.7 SPIN-OFFS, START-UPS

Creation of a spin-off company 'electron SoftView lda.' (Potuguese NIF 515015288) with the collaboration of TechMinho and the Department of Software Engineering of the University of Minho, including the preparation of the Business Plan, in the frame of the prize 'SpinUM - Best Business Idea'. Founders: D. Martinez-Martinez, C. Mansilla-Sanchez, A. Proença, P. Sousa, E. T. Faber, J.Th.M. de Hosson. CEO: D. Martinez-Martinez.

6.3.8 Supervision of Research Students

6.3.8.1 PhD projects completed in 2018

Author	Supervisor	Title	Situation
Cristiana Alves	Sandra Carvalho	Desenvolvimento de superfícies bioativas para o crescimento ósseo em implantes dentários	University of Minho
Pedro Martins	S. Lanceros-Mendez; Madalena Alves.	"New generation of photocatalytic nanocomposites: production, characterization and environmental application",	PhD in Sciences (Physics), Defended Nov 2018

Cláudia de Jesus Ribeiro Lopes	Filipe Vaz	Development of Ti-based intermetallic thin films for enhanced biomedical sensing performance	PhD Science - Physics December 2018.
Juliana Dias - Science Phd Program	S. LancerosMendez	Electrospun ionic electroactive polymer for artificial miscle applications	ECUM

6.3.8.2 PhD projects in progress

Author	Supervisor	Title	Situation
Al-Rjoub, Design	L.Rebouta, S. Lanceros Mendez	fabrication, characterization and aging studies of selective solar selective absorber surfaces	MAPFIS doctoral program
Hugo Salazar	S. Ferdov, S. Lanceros Mendez	New generation of polymer composite membranes for water purification	SFRH/BD/122373/2016
Filipe da Costa Correia (Programa Doutoral de Engª de Materiais - UMinho)	Carlos Tavares e Adélio Mendes (UPorto)	Desenvolvimento de filmes finos heteroestruturados de ZnO com propriedades termoelétricas, para aplicação em células solares	Engeneering School
Juliana Filipa Gouveia Marques (Programa Doutoral de Engª de Materiais - UMinho)	Carlos Tavares	Difusão controlada de compostos ativos do interior de microcápsulas mediada por ativação solar	Engeneering School
Marta Adriana Félix Forte (Programa Doutoral em Materiais e Processamento Avançados – AdvaMTech)	Carlos Tavares e Rui Silva (UAveiro)	Encapsulation of phytonutrients in polymeric microcapsules coated with photocatalytic nano materials	Engeneering School
Pablo Andres General Toro (Dout. Artes - Conservação e Restauro)	Eduarda Vieira (CITAR/UCP), Patrícia Raquel Fernandes de Melo Moreira da Costa (CITAR / CIBQF / UCP) Mario A. C. C. Pereira (CFUM-UP)	"A obra escultórica em bronze de Soares dos Reis: análise, valorização e conservação em contexto museológico e em espaço público"	Starts on Nov. 2018 at CITAR – Universidade Catolica Portuguesa
Veniero Lenzi	Luís Marques	Simulation of rheological and adhesive properties of isocyanate-based polymeric materials.	PhD Sciences
António Castro	Luís Marques UM), Sebastian Velasco (INL)	Study of the oxidation mechanisms of bimetallic Nanoparticles.	PhD Materials
Célia Ribeiro	Clara Pereira Coutinho, Lia	"Um Contributo para a Integração de Atividades de Robótica Educativa no Ensino Básico"	IE

	Raquel Oliveira, IE, University of Minho; Manuel Filipe Costa, Physics Department, University of Minho (Portugal)		
Iran Segundo	Elisabete Freitas, Civil Engeneering Department, University of Minho (Portugal) and Joaquim Carneiro, Physics Department, University of Minho (Portugal)	Superfícies de pavimentos rodiviários ecológicas, fotocatalíticas, hidrofóbicas e autolimpantes	FCT Fellowship (SFRH/BD/137421/2018)
Salmon Landi	Joaquim Carneiro, Physics Department, University of Minho (Portugal) and Pier Parpot, Chemical Department, University of Minho (Portugal)	Tratamento de efluentes industriais através de processos fotocatalíticos com dióxido de titânio	Science PhD Program – CAPES Fellowship
Marco Pires M. S. Rodrigues	Filipe Vaz Joel Borges	Nano-designed LSPR thin films using GLAD in reactive magnetron sputtering for optical sensing	MAPFIS doctoral program
Manuela Carvalho Proença	Filipe Vaz Joel Borges	Nanoplasmonic thin films of Au-Ag/MOx functionalized with molecular recognition elements to enhance sensitivity and selectivity of LSPR gas sensors	MAPFIS doctoral program
Catarina Isabel da Silva Oliveira	J. Th. M De Hosson, Diego Martinez-Martinez, Luís Cunha	Deposition and characterization of sputtered Zr-O-N based films for fine tuning of their physical propertie	Phd Materials
Ferreira	F. Samuel, S. Carvalho	New processing technologies for improved compression piston rings performance	MIT Portugal PhD Program
Simone Rodrigues	S. Carvalho, A. Cavaleiro	Development of hydrophilic/oleophobic treatments for self-cleaning anti-greasy surfaces	AdvaMTech PhD program
Edgar Carneiro	S. Carvalho	Desafios REACH: revestimentos alternativos ao Cr hexavalente	Doctoral Program on Surface and Protection Engineering e inscrito Programa Doutoral em Engenharia de Materiais da Universidade do Minho

Diogo Cavaleiro	Sandra Carvalho e Filipe Fernnades	The importance of Ag content for optimizing the machining performance of Ti-Si-(Ag)-N coatings	Doctoral Program on Surface and Protection Engineering e inscrito Programa Doutoral em Engenharia de Materiais da Universidade do Minho
Luísa Fialho	Sandra Carvalho /CFUM) e Maria Helena Fernnades (UPorto)	Design of new biocompatible osseointegrated implants	Doctoral Program on Surface and Protection Engineering e inscrito Programa Doutoral em Engenharia de Materiais da Universidade do Minho
Diogo Ramos	Sandra Carvalho (CFUM) João Paulo Rodrigues(UNova Lisboa)	Development of new coatings for dental implants	Doctoral Program on Surface and Protection Engineering e inscrito Programa Doutoral em Engenharia de Materiais da Universidade do Minho
Ana Catarina Branco Lima Engenharia de Materiais	Pedro Libânio Martins (UM), Yury Kolen'ko (INL), Senentxu L. Mendez (UM/BC Materials)	Development, optimization and "green" printing of inks for electronic components and sensing devices	ECUM
Bruna Gonçalves Programa Doutoral em Engenharia de Materiais	Senentxu LancerosMéndez (UM); Yury Kolen'ko (INL) e Gabriela Botelho (UM)	Printable photovoltaic systems based on Cu(In,Ga)Se2 chalcopyrite	ECUM
Jivago Serrado Gomes Aguiar Nunes; Engenharia de Materiais	S. LancerosMendez	Polymer based sensors fabricated by printing technologies	EEUM
Juliana Alice Ferreira Oliveira Programa Doutoral em Engenharia de Materiais	S. LancerosMendez	Radiation detectors based in inkjet printing technologies	EEUM
Sylvie de Oliveira Ribeiro Programa doutoral em engenharia de materiais	Senentxu L. Mendez (UM), Andreia Gomes (UM), Carlos Baleizão (Instituto Superior Técnico)	Tailoring electroactive polymer nanocomposites for novel muscle tissue engineering applications	EEUM
Nelson Miguel Macedo da Silva Pereira	José Rocha, Laneros Mendez (UM)	Development of a Magnetic Levitation System and Control, Applied to Sliding Windows	EEUM
Bogdan Postolnyi	Co - Luís Manuel Fernandes Rebouta	Multilayer CrN/MoN Protective Coatings with Enhanced Hardness and Toughness	EEUM

Isabel Lopes	Co - Luís Manuel Fernandes Rebouta	Optical and tribological properties of femtosecond laser nanotextured surfaces	PhD AdvaMTech
Teresa Almeida	Lanceros Mendez (UM)	Biodegradable electroactive polymer materials as a novel approach for neural tissue engineering applications	EEUM
João Teixeira	Maria Botelho (Quim) Lanceros Mendez (UM)	Multifunctional air filters based on emerging natural polymers for VOCs removal	EEUM
Tiago Marinho	Laneros Mendez (UM)	Printable energy harvester systems for wearable sensors devices	EEUM

6.3.8.3 MSc projects completed in 2018

Author	Supervisor	Title	Situation
João Braga da Silva,(MIEMAT)	Mario A. C. C. Pereira, José Pedro Basto da Silva	"Estruturas ferroelétrico/dielétrico para dispositivos de memória"	Defense in November 2018 at School of Sciences and School of Engineering, UM.
Marcelo José Silva Oliveira, (MIEMAT),	Mario A. C. C. Pereira, José Pedro Basto da Silva	"Produção e caracterização de filmes finos ferroeléctricos com nanopartículas metálicas incorporadas para aplicações na microelectrónica"	Defense in March 2018 at School of Sciences and School of Engineering, UM.
Ricardo Rego	Joaquim Carneiro and Renato Gonçalves	Novas membranas porosas baseadas na celulose para separadores em baterias de ião-lítio	ECUM
Filipe Miranda	Joaquim Carneiro and Vasco Teixeira	Desenvolvimento de um sensor de humidade usando estruturas anódicas de óxido de alumínio	ECUM
Maria Manuela Carvalho Proença	Joel Nuno Pinto Borges Paula Sampaio (CBMA)	Development of nanoplasmonic thin films for gaseous molecules detection	Biofísica e Bionanosistemas. January 2018
Diana Isabela Faria Meira	Joel Nuno Pinto Borges Paula Sampaio (CBMA)	Funcionalização de filmes finos plasmónicos de Au-TiO2 com elementos de bioreconhecimento para deteção de biomoléculas	Mestrado em Biofísica e Bionanosistemas. December 2018
Patrícia Alexandra Pereira da Silva	Joel Nuno Pinto Borges Paula Sampaio (CBMA)	Development of ZnO thin films for antimicrobial applications.	Mestrado em Biofísica e Bionanosistemas. December 2018
Teresa Isabel Marques de Almeida	Filipe Vaz e Vanessa Cardoso	Desenvolvimento de scaffolds poliméricos padronizados para aplicação em engenharia de tecidos	Mestrado em Biofísica e Bionanosistemas. Febrauary 2018

Victor Sérgio Fernandes Gonçalves	Filipe Vaz e Teresa Matamá	Estudo das interações de filmes finos intermetálicos do tipo Ti-Me (Me = Ag, Au, Al, Cu) com sistemas biológicos, aplicados à funcionalização de elétrodos/sensores do tipo polimérico para dispositivos biomédicos	Mestrado em Biofísica e Bionanosistemas. March 2018

7 Appendices

7.1 Externally funded projects at CFUM ("*Projetos Individuais*"), ongoing in 2018

Title	Researcher	Funding entity	Start date	Global Budget - UM	End date
PLASCOAT - Metalização inovadora e ecológica de plásticos por PVD e CVD assistido por plasma	Filipe Vaz	ANI	01/01/2016	236 436,89 €	31/12/2018
SAM - Otimização do desempenho térmico da moldação por injeção	Filipe Vaz	ANI	01/10/2016	157 062,56 €	30/09/2019
WinPSC - Novos avanços tecnológicos para a terceira geração de células solares sensibilizadas com perovskita	Carlos Tavares	ANI	01/01/2017	193 150,03 €	31/12/2019
ReleaseME - Micro ou nanocápsulas com propriedades fotocatalíticas para libertação controlada de agentes difusores e respetivo método de obtenção	Carlos Tavares	ANI	01/10/2016	55 859,37 €	30/09/2019
DermoID - Interhiegine	Carlos Tavares	ANI	01/12/2016	61 163,77 €	30/11/2019
ON-SURF	Sandra Carvalho/Filipe Vaz	ANI	01/10/2017	478 235,35 €	30/09/2020
GNESIS - Graphenest's New Engineered System and its Implementation Solutions	Nuno Peres	ANI	01/11/2017	413 325,89 €	30/04/2019
THELINK - European Training Network to Accelerate the Development Chain of Nanostructured Polymers	Marta Ramos	CE	01/11/2014	443 016,72 €	31/10/2018
Voyage - Opportunities for the young and graduates employability in Vietnam	Filipe Costa	CE	15/10/2015	40 306,00 €	14/10/2018

TEXSTRA - TEXTILE STRATEGY FOR INNOVATIVE HIGHER EDUCATION	Sandra Carvalho	CE	01/09/2017	26 225,00 €	29/02/2020
GrapheneCore2 - Graphene-based revolutions in ICT and beyond	Nuno Peres	CE	01/04/2018	250 129,78 €	31/03/2020
NANOTHERAPEUTICS: DEVELOPMENT OF BIONANOSYSTEMS FOR DRUG DELIVERY	Marlene Lúcio	FCT	02/09/2013	50 000,00 €	01/09/2018
DNTOSIETAA -Design of New Tetrahedral-Octahedral Silicates via Ion Exchange - Towards Advanced Applications	Stanislav Ferdov	FCT	01/01/2015	50 000,00 €	31/12/2018
SUPROCOAT - Super Protective Coatings (SUPROCOAT): MAX/Lubricant nanocomposite coatings deposited at low temperature by magnetron sputtering	Diego Martinez	FCT	01/01/2015	50 000,00 €	30/06/2019
NANOSAFELEATHER - The effect on human health of Ag/TiO2NM-treated leathers for footwear industry	Sandra Carvalho	FCT	01/01/2015	125 364,00 €	31/12/2018
EyElectro - OPTICAL CUSTOMIZATION OF ELECTRIPHYSIOLOGICAL RETINAL ACTIVITY IN HUMANS	José Manuel Meijome	FCT	01/06/2016	185 546,00 €	01/06/2019
LA2D - Large area two dimensional heterostructures for photodetectors	Ricardo Ribeiro	FCT	01/07/2016	58 380,00 €	01/07/2019
ABSOLAR - Solar selective absorber for high temperature applications	Luís Rebouta	FCT	01/07/2016	83 748,00 €	30/06/2019
ClusterStent - Clusters bimetálicos para ação antimicrobiana controlada em stents	Sandra Carvalho	FCT	01/07/2016	1 000 895,00 €	01/07/2019

NANOSENSING - Filmes finos semicondutores do tipo nanocompósito, compostos por nanopartículas de metal nobre dispersos em matrizes reativas óxido-metal para aplicações em detetores de gases com base em ressonância	Filipe Vaz	FCT	01/07/2016	85 584,00 €	30/06/2019
HIT-RIB - Development of heterojunction silicon ribbon solar cells	Fátima Cerqueira/Pedro Alpuim	FCT	01/07/2016	85 815,00 €	31/12/2018
NANOCONCOR - New nanocontainers with extended functionality based on layered double hydroxides for application in corrosion protection	Luís Vieira	FCT	01/05/2016	20 400,00 €	30/04/2019
PrintPV - Large-scale printing of novel photovoltaics based on Cu (In, Ga) Se2 chalcoprite	Senen Lanceros Mendez	FCT	01/06/2016	78 528,00 €	31/05/2019
ALD4MAX - Atomic Layer Deposition For tailored bottom-top growth of MAX and MXene films	Diego Martinez	FCT	01/09/2017	105 000,00 €	31/08/2020
Atrito 0 - A sinergia entre texturização e revestimentos auto-lubrificantes para contactos mecânicos energeticamente mais eficientes e mais amigos do ambiente	Sandra Carvalho	FCT	01/06/2018	75 206,25 €	31/05/2021
DEMON - Defect Engineering in rare-earth nickelate thin films towards active magnetic and optical metamaterials	Bernardo Almeida	FCT	01/07/2018	46 012,50 €	30/06/2018

TO CHAIR: Os Desafios Óptimos na Irrigação	Sofia Lopes	FCT	01/06/2018	168 785,31 €	31/05/2021
Centro de Física das Universidades do Minho e do Porto	Mikhail Vasilevskiy	FCT	01/01/2015	510 000,00 €	01/12/2019
Graphsens - Mid- and far-infrared plasmonic biosensing with graphene	Nuno Peres	FCT	01/07/2018	78 211,01 €	30/06/2021
Multidisciplinary approach to alteration, alterability and conservation of Soares dos Reis' geomaterial sculpture: breaking boundaries in museum paradigmas and creating value in changing societies	Mário Pereira	FCT	01/06/2018	37 500,00 €	31/05/2021
MicroTreat - Biomimetic microenvironment for the study and development of targeted therapies in hematological malignancies	Vanessa Cardoso	FCT	01/07/2018	218 603,00 €	30/06/2021
MAGLIDUO - MAGnetoLIposomes for DUal cancer therapy	Paulo Coutinho	FCT	01/07/2018	158 483,17 €	30/06/2021
MusclEng: Development of advanced strategies and solutions for muscle tissue engineering based on electromechanical microenvironments	Clarisse Ribeiro	FCT	01/07/2018	220 458,12 €	30/06/2021
DNANO4BIO - Development of a nanoplasmonic sensing system for detection of mycotoxins in wine	Filipe Vaz	FCT	01/07/2018	117 558,20 €	30/06/2021
Non Linear Optical Properties of Layered Materials	Nuno Peres	FCT	15/07/2018	27 000,62 €	14/07/2021

Control of Port and Douro Wines authenticity using graphene DNA sensors	João Pedro Alpuim	FCT	15/06/2018	43 712,50 €	14/06/2021
CONCERT –Silk-coated honeycomb nanocarriers for cancer therapy	Marlene Lúcio	FCT	01/07/2018	238 120,65 €	30/06/2021
Nano-sized oxygen scavenger for new active food packaging	Sebastian Calderon	FCT	01/07/2018	195,008,16	30/06/2021
ODe2D - Towards high speed optical devices by exploiting the unique electronic properties of engineered 2D materials	Michael Scott Belsley	FCT	01/07/2018	234 301,87 €	30/06/2018
Design of new antimicrobial osseointegrated dental implants	Sandra Carvalho	FCT	26/07/2018	193 420,63 €	25/07/2021
LensUM - Alterações óticas e biométricas do cristalino com a acomodação e o seu impacto na qualidade subjetiva da imagem da retina.	Sandra Franco	FCT	01/07/2018	184 658,12 €	30/06/2018
Optical Nanorulers for Super Resolution Microscopy & Sensing	João Pedro Alpuim	FCT	01/06/2018	31 737,50 €	31/05/2021
FLIP -Functional laticce instabilities in naturally layered perovskites	Bernardo Almeida	FCT	10/08/2018	55 543,45 €	09/08/2021
ESC4SHI: Simulação e Computação eficiente para a Saúde, o Mar e a Indústria	Stéphane Louis Clain	FCT	15/07/2018	154 045,62 €	14/07/2021
E-print: Baterias impressas avançadas amigas do ambiente para dispositivos portáteis	Carlos Costa	FCT	01/10/2018	210 158,12 €	30/09/2021

SATRAP: Rational design of Self-Assembling networks for TRansparent electrode Applications	Marta Ramos	FCT	01/10/2018	164 707,40 €	31/09/2021
Controllub	Luis Silvino	FCT	01/11/2018	35 000,00 €	31/10/2019
UT-Born	Luis Silvino	FCT	01/11/2018	48 923,00 €	31/10/2019
SURFPROTEC - Programa de Doutoramento Nacional em Engenharia e Proteção de Superfícies	Sandra Carvalho	Norte 2020	01/09/2015	317 250,00 €	31/08/2019

7.2 CFUM Resarch Fellows in 2018

Name	Tipe	Beginning	End
Rafael Navarro	Invited Researcher	01/09/2018	26/11/2018
António T. Costa	Invited Researcher	17/09/2018	16/11/2018

Name	Tipe	Supervisor	Beginning	End
Vítor Alexandre Abreu Pacheco	BGCT	Mikhail Vasilevskiy	01-01-2018	31-12-2108
Cibelii Garcia	BGCT	Carlos Tavares	01/08/2018	31/12/2018
Manuel José Lima Ferreira Rodrigues	BI	João Pedro Santos Hall Agorreta Alpuim	01/05/2018	30/09/2018
Sérgio Rafael Silva Veloso	BI	Elisabete Maria Santos Castanheira Coutinho	01/05/2018	31/12/2018
José Nuno Santos Gomes	BI	Mikhail Vasilevskiy	01/05/2018	31/12/2018
Beatriz Amorim Ferreira	BI	Nuno Miguel Machado Reis Peres	01/05/2018	31/12/2018
Rita Magalhães Polícia	BI	Senen Lanceros Mendez	10/05/2018	31/12/2018
Andreia Esteves Gomes	BI	Sérgio Miguel Cardoso Nascimento	07/05/2018	31/12/2018
Marcelo José Silva Oliveira	BI	José Pedro Basto da Silva	10/05/2018	31/12/2018
Ana Filipa Pereira Mota	BI	José Manuel González Meijome	09/05/2018	31/12/2018
João Miguel Peixoto Oliveira	BI	Cacilda Maria Lima Moura	10/05/2018	31/12/2018
Eduarda Barbosa Fernandes	BI	Marlene Lucio	01/07/2018	31/12/2018
Ana Rita de Oliveira Rodrigues	BI	Elisabete Coutinho	01/07/2018	30/09/2018
Nelssom Fernandez da Cunha	BI	Luis Rebouta	16/07/2018	31/12/2018

Diogo Colelho Silva	BI	Bernardo Almeida	01/10/2018	31/12/2018

7.3 Key Words by Research Line

7.3.1 Assessment and enhancing visual performance

Binocular vision	Color science	Ocular accommodation
Color science	Computational models	Ocular disease
Epidemiology	Contact lenses	Ocular surface
Visual assessement	Dry eye	Ophthalmic instrumentation
Ocular accommodation	Electrophysiology	Optical modelization
Ocular growth	Epidemiology	Optics
Ocular surface	Glare	Perception
Optics	Hyperspectral imaging	Presbyopia
Perception	Image quality metrics	Refractive surgery
Visual electrophysiology Visual enhancement	Intraocular lenses	Rehabilitation
Visual optics	Irregular cornea	Retina
Visual rehabilitation	Keratoconus	Stereoscopic vision
Aberrometry	Low vision	Tear film
Accommodative disorders	Microbial contamination	Vision performance
Adaptive optics	Myopia	Visual ergonomics
Augmented reality	Myopia control	Visual optics
Binocular vision	Myopia progression	Visual optimization
		Visual therapy

7.3.2 Physics of quantum materials and bionanostructures

Electronic structure,	FRET (Forster Resonance Energy Transfer)	Photocatalysis
(Bio)Sensors	Graphene	Plasmonic nanostructures
2D materials	Lipid (bi)layer	Quantum dot
Anti-tumour drugs	Luminescence	Quantum materials
Biomolecules	Magnetic nanoparticles	Quantum nanostructures
Bionanoconjugates	Mathematical Physics	Raman and Infrared Spectroscopy
charge carrier dynamics,	Nanocarriers	Solar Cells
Density Functional Theory (DFT)	Nanomedicine	Sol-gel
Drug delivery	Nonlinear optical materials	Surface Enhanced Raman Spectroscopy
Energy transfer / FRET	Optimal Control Theory	Surface plasmon resonance
Exciton	Partial differential equations	Thin films
Finite elements	Phase transitions	Transport properties,
Fluorescent probes	Phonon	Ultrafast Spectroscopy
Piezoelectric	pyroelectric properties	

7.3.3 Functional and smart materials and surfaces for advanced applications

Actuator	HWCVD - Hot wire chemical vapour deposition	Photoluminescense, fluorescence
Biomaterials	Hybrid material	Piezoelectric
Biosensor	Laser ablation	PLD - Pulsed laser deposition
Coating	Magnetoelectrics and magnetic properties	Printed, printing
Coating - antibacterial	Membrane	PVD - physical vapour deposition
Coating - medical device	Microporous	Sensor
Crystal growth	Modelling, materials modelling	Smart material
Crystallography	Nanomaterial, nanocluster, nanoparticle	Smart polymer
Decorative coating	Nanoporous	Solar cell
Density functional theory	Nitride	Sputtering
Detector	Non-linear optics	Surface topography, tribolofy, wettability
Electrical, thermal, mechanical properties	Optical properties	Synthesis
Energy harvesting	Oxide	Thin film, thin layer
Ferroelectric	Photocatalysis, catalysis	