Centre of Physics of the University of Minho

Activity Report 2020

April 2021

Contents

1. Introduction

The year 2020 was marked by the pandemic due to the corona virus that limited many of the research activities, mainly those of laboratory nature. However, the number of regular journal articles and conference journal articles grew for the third consecutive year (190/20 in 2020 vs 171/23 in 2019 and 155/7 in 2018 for ISI WoK papers), with a slight decrease of the average impact factor (4.02 in 2020 vs 4.11 in 2019). Of the articles published, it is worth mentioning a paper in the journal Science (IF = 41.8) and another in the journal Progress in Energy and Combustion (IF = 28.9). At the same time, the distribution of the scientific production among Centre's members remains quite uneven, with a significant percentage of effective members (40%) who published just one paper or none in 2020. Noteworthy are the awards received in 2020 for spin-off projects, in particular, in the area of Nanotechnology (medicine and environment) and the Essilor prize for Innovation and Research in Optics.

As mentioned in previous reports, the number of young researchers that were hired with reasonably long-term contracts during the last years is strengthening the Centre and is helping in the increase of the level of research and related activities at CFUM. Additionally, the significant increase of the PhD students, affiliated to CFUM or co-supervised of CFUM members, (76 in 2020 vs 57 in 2019) will contribute to increasing the Centre´s dynamism in the near future. The number of completed theses continues to grow (13 in 2020 vs 10 in 2019 and 7 in 2018), being closer to expectations, taking into account the number of ongoing theses. It should be noted that the number of effective members of the Centre remained at the same level (67 in 2020 vs 68 in 2019).

The year 2020 also coincided with the start of the strategic project, which will have a duration of 4 years, as a result of the last evaluation of very good, which will also allow the purchase of equipment in a value of 350 k€.

The number of funded projects at CFUM remained stable (around 50), with a budgetary execution of 2 M€ in 2020 (1.4 M€ in 2019), which corresponds to a considerable increase. The Portuguese agencies, ANI and FCT, remain our principal sources of funding. Unfortunately, European Commission funding decreased again in 2020, becoming a residual funding.

The application for an associated laboratory was drawn up, which brought together the CF-UM-UP, IFIMUP and CeFEMA research centres. The associated laboratory "Laboratory of Physics for Materials and Emergent Technologies (LaPMET)" was approved already in 2021. Unfortunately, the approved budget is much smaller than initially planned, and the hiring of researchers initially foreseen in the application remains in doubt.

These results confirm the dynamism and high quality of the Physics Centre, in particular the dedication and effort of the Centre's researchers. Finally, I would like to thank the Group Coordinators for their collaboration, the administrative support of Paula Cristina Antunes, Vitor Pacheco and Fernanda Costa, and the help of the technical staff who collaborated in various ways in the operation of the Centre.

Luís Rebouta

2. Organization

Members of the Centre

Effective Members with PhD (at December 31st)	67
Post-Docs and Collaborators with PhD	28
PhD Students (supervised/co-supervised by CFUM members)	76 (36/40)

Management Entities

Director:
Mikhail Igorevich Vasilevskiy (until March, 16th)
Luís Manuel Fernandes Rebouta (from March, 17th)

Deputy Director:
Luís Manuel Fernandes Rebouta (until March, 16th)
Mikhail Igorevich Vasilevskiy (from March, 17th)

Executive Committee Members:

1. Paulo José Gomes Coutinho
2. Maria Madalenada Cunha Faria de Lira
3. Carlos José de Macedo Tavares

Members of the Scientific Council (effective CFUM members):

1	Ana Rita Oliveira Rodrigues	Junior Researcher - Project
2	Anabela Gomes Rolo	UM teaching staff (Dep. Physics)
3	António Filipe Teixeira Macedo	UM teaching staff (Dep. Physics)
4	António Manuel Gonçalves Baptista	UM teaching staff (Dep. Physics)
5	António Manuel Marques Queirós Pereira	UM teaching staff (Dep. Physics)
6	Armando José Barros Ferreira	Junior Researcher - CFUM
7	Bernardo Gonçalves Almeida	UM teaching staff (Dep. Physics)
8	Bruno António Campos Amorim	Junior Researcher - CFUM
9	Cacilda Maria Lima de Moura	UM teaching staff (Dep. Physics)
10	Carlos José de Macedo Tavares	UM teaching staff (Dep. Physics)
11	Clarisse Marta Oliveira Ribeiro	Junior Researcher - CFUM
12	Claudia Jesus Ribeiro Lopes	Junior Researcher - CFUM
13	Daniela Patricia Lopes Ferreira	UM teaching staff (Dep. Physics)
14	Diogo Alberto Rocha Lopes	Junior Researcher - Project
15	Eduardo Jorge Nunes Pereira	UM teaching staff (Dep. Physics)
16	Elisabete Maria dos Santos Castanheira Coutinho	UM teaching staff (Dep. Physics)
17	Etelvina de Matos Gomes	UM teaching staff (Dep. Physics)

18	Francisco José Machado de Macedo	UM teaching staff (Dep. Physics)
19	Gaspar José Brandão Queirós Azevedo Machado	UM teaching staff (Dep. Mathematics)
20	Gueorgui Vitalievitch Smirnov	UM teaching staff (Dep. Mathematics)
21	Irene Estevez Caride	Assistant Researcher - Project
22	João Manuel Maciel Linhares	UM teaching staff (Dep. Physics)
23	João Pedro Santos Hall Agorreta Alpuim	UM teaching staff (Dep. Physics)
24	Joaquim Alexandre dos Santos Almeida de Oliveira Carneiro	UM teaching staff (Dep. Physics)
25	Joel Nuno Pinto Borges	Junior Researcher - Project
26	Jorge Manuel da Silva Figueiredo	UM teaching staff (Dep. Mathematics)
27	Jorge Manuel Martins Jorge	UM teaching staff (Dep. Physics)
28	José Carlos Viana Gomes	UM teaching staff (Dep. Physics)
29	José Filipe Vilela Vaz	UM teaching staff (Dep. Physics)
30	José Manuel González Méijome	UM teaching staff (Dep. Physics)
31	José Pedro Basto da Silva	Junior Researcher - CFUM
32	Luís António Carvalho Gachineiro da Cunha	UM teaching staff (Dep. Physics)
33	Luís Manuel Fernandes Rebouta	UM teaching staff (Dep. Physics)
34	Luís Manuel Gomes Vieira	UM teaching staff (Dep. Physics)
35	Luís Silvino Alves Marques	UM teaching staff (Dep. Physics)
36	Manuel Filipe Pereira da Cunha Martins Costa	UM teaching staff (Dep. Physics)
37	Maria de Fátima Guimarães Cerqueira	UM teaching staff (Dep. Physics)
38	Maria de Jesus Matos Gomes	UM teaching staff (Dep. Physics)
39	Maria Elisabete da Cunha Dias Real Oliveira	UM teaching staff (Dep. Physics)
40	Maria Madalena da Cunha Faria de Lira	UM teaching staff (Dep. Physics)
41	Mário António Caixeiro de Castro Pereira	UM teaching staff (Dep. Physics)
42	Mário Rui da Cunha Pereira	UM teaching staff (Dep. Physics)
43	Marlene Susana Dionísio Lúcio	Junior Researcher - Project
44	Marta Maria Duarte Ramos	UM teaching staff (Dep. Physics)
45	Martin Andritschky	UM teaching staff (Dep. Physics)
46	Michael Scott Belsley	UM teaching staff (Dep. Physics)
47	Mikhail Igorevich Vasilevskiy	UM teaching staff (Dep. Physics)
48	Nuno Miguel Machado Reis Peres	UM teaching staff (Dep. Physics)
49	Paulo José Gomes Coutinho	UM teaching staff (Dep. Physics)
50	Paulo Rodrigues Botelho Fernandes	UM teaching staff (Dep. Physics)
51	Pedro Libânio Abreu Martins	Assistant Researcher - CFUM
	Pedro Manuel Abreu Martins (until November)	Junior Researcher - Project
52	Peter Michael Schellenberg	Junior Researcher - Project
53	Raquel Diana Carneiro Alves	Junior Researcher - Project
54	Ricardo Pedro Lopes Martins de Mendes Ribeiro	UM teaching staff (Dep. Physics)
55	Rosa Maria Ferreira Batista	Junior Researcher - CFUM
56	Rui Miguel Soares Pereira	UM teaching staff (Dep. Mathematics)
57	Sandra Maria de Braga Franco	UM teaching staff (Dep. Physics)
58	Sandra Maria Fernandes Carvalho	UM teaching staff (Dep. Physics)

59	Sandra Mariana Silva Marques	Junior Researcher - Project
60	Senen Lanceros-Mendez	UM teaching staff (Dep. Physics)
61	Sérgio M. Cardoso Nascimento	UM teaching staff (Dep. Physics)
62	Serguey Pyrlin	Junior Researcher - Project
63	Silvie Oliveira Ribeiro	Junior Researcher - Project
64	Sofia Oliveira Lopes	UM teaching staff (Dep. Mathematics)
65	Stanislav Lazarov Ferdov	Assistant Researcher - CFUM
66	Stephane Louis Clain	UM teaching staff (Dep. Mathematics)
	Tatiana Gabriela Rappoport (until Sep.)	Junior Researcher - Project
67	Vasco Manuel Pinto Teixeira	UM teaching staff (Dep. Physics)

Colaborators with PhD – staff members

1	Ana Maria Fernandes de Pinho Dias	UM (Dep. Physics)
2	António Mário Lourenço da Fonseca Almeida	UM (Dep. Physics)
3	Jorge António Silva Mendes	Inst. Politecnico Vila do Conde
4	José Alberto Díaz Rey	UM (Dep. Physics)
5	José Luis Pires Ribeiro	UM (Dep. Physics)
6	Júlia Maria Simões Dias Barata de Tovar Ayres de Campos	UM (Dep. Physics)
7	Li-Jian Meng	ISEP (Dep. Physics)
8	Maria José Fontes Alexandre Forjaz de Sampaio	UM (Dep. Physics)
9	Maria Teresa Pitta de Lacerda-Arôso	UM (Dep. Physics)
10	Mário Jorge Dias Zamith Silva	UM (Dep. Physics)
11	Teresa Maria Santos Ribeiro Viseu	UM (Dep. Physics)
12	Vasco Miguel Nina de Almeida	UBI (Dep. Physics)
13	Vanessa Fernandes Cardoso	UM (Engineering School)
14	Vitor Manuel Gomes Correia	UM (Enginnering School)

Other Colaborators with PhD

1	Ana Pedro Lemos Paião	Junior Researcher – Project
2	Anura Samantilleke	Colaborator
3	Augusto Cesar Lima Moreira	UMINHO/BPD/38/2019 (100%)
4	Carlos Miguel Silva Costa	SFRH/BPD/112547/2015 (100%)
5	Diego Martinez Martinez	Colaborator
6	Filipe André Peixoto Oliveira	UMINHO/BI/474/2019 (100%)
7	Filipe Daniel Fernandes	SFRH/BPD/116334/2016 (100%)
8	Flávio Ferreira	UMINHO/BI/184/2019
	Isabel Sofia Melo Pereira (until july)	Junior Researcher - Project
9	Jaime Eduardo Vieira Silva Moutinho Santos (until jan.)	UMINHO/BI/407/2018 (100%)
	Juliana Cristina Rodrigues Dias (until Sep.)	Junior Researcher - Project
10	Lina Fernanda Ballesteros Giraldo	Junior Researcher - Project
11	Margarida Maria Macedo Francesko Fernandes	SFRH/BPD/121464/2016 (70%)
12	Maria José Bastos Pires Lima (since october)	UMINHO/BI/355/2019 (100%)
13	Pedro Filipe Ribeiro Costa	SFRH/BPD/110914/2015 (50%)
14	Yuliy Bludov (until Mach)	UMINHO/BPD/23/2018 (100%)

PhD Students

Author	Host institution/Program	Reference	Ongoing/ Completed
Ana Isabel Carvalho Amorim de Sousa	PhD in Optometry and Vision Science, UMinho	SFRH/BD/136684/2018	Ongoing
Alshaarawi M. A. Salem	PhD in Optometry and Vision Science, UMinho	OWN	Ongoing
Ana Catarina Branco Lima	Doctoral Program in Materials Engineering	SFRH/BD/132624/2017	Ongoing
Ana Rita Pereira da Silva	Doctoral Program in Materials Engineering	SFRH/BD/131905/2017	Ongoing
Ander Reizabal Lopez-Para,	PhD In Sciences chemistry	BCMaterials	Completed
André Gustavo Silva de Macedo	Doctoral Program in Materials Engineering	2020.09218.BD	Ongoing
Andreia Esteves Gomes	PhD in Optometry and Vision Science, UMinho	SFRH/BD/147336/2019	Ongoing
Andreia Marina de Sousa Almeida	Doctoral Program in Biomedical Sciences, ICBAS, Univ. Porto	SFRH/BD/118721/2016	Ongoing
António Castro	SURFPROTEC - Programa de Doutoramento Nacional em Engenharia e Proteção de Superfícies	UMINHO/BD/48/2017	Ongoing
Balaji Sompalle	Doctoral Program in Physics (MAP-Fis)	OWN	Ongoing
Beatriz Dias Cardoso	Doctoral Program in Materials Engineering	SFRH/BD/141936/2018	Ongoing
Bogdan Postolnyi	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/129614/2017	Completed
Bruna Ferreira Gonçalves	Doctoral Program in Materials Engineering	SFRH/BD/121780/2016	Ongoing
Bruna Machado da Silva	Doctoral Program in Physics (MAP-Fis)	UMINHO/BI/194/2019	Ongoing
Bruno Alexandre Alves Santos	Doctoral Program in Materials Engineering	2020.09630.BD	Ongoing
Bruno Rodrigues Pacheco e Murta	Doctoral Program in Physics (MAP-Fis)	2020.08444.BD	Ongoing
Carlos Fernandes	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/150770/2020	Ongoing
Catarina Isabel da Silva Oliveira	Doctoral Program in Materials Engineering	OWN	Ongoing
Celso Joel Oliveira Ferreira	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/149199/2019	Ongoing
César Rui de Freitas Bernardo	Doctoral Program in Physics (MAP-Fis)	SFHR/BD/102616/2014	Completed
Clara Maria dos Santos Pereira.	PhD In Sciences (Biology)	OWN	Ongoing
Cláudia Vanessa Dias Reis	Doctoral Program in Science and Engineering of Polymers and Composites	SFRH/BD/137531/2018	Ongoing
Cristian Mendes Felipe	PhD In Sciences chemistry	BCMaterials	Completed
Daniela Morais	Doctoral Program Chemical and Biological Engineering (FEUP)	SFRH/BD/146476/2019	Ongoing

Danilo Pedrelli	Doctoral Program in Physics (MAP-Fis) - CAPES	CAPES	Completed
Diana Isabel Faria Meira	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/143262/2019	Ongoing
Diogo Albano Cavaleiro Ventura de Carvalho	SURFPROTEC - Programa de Doutoramento Nacional em Engenharia e Proteção de Superfícies	UMINHO/BD/29/2016	Ongoing
Diogo Emanuel Carvalho Costa	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/136279/2018	Ongoing
Diogo Jorge Martins Ramos	SURFPROTEC - Programa de Doutoramento Nacional em Engenharia e Proteção de Superfícies	UMINHO/BD/56/2018	Ongoing
Edgar Manuel Neto Carneiro	SURFPROTEC - Programa de Doutoramento Nacional em Engenharia e Proteção de Superfícies	UMINHO/BD/30/2016	Ongoing
Eduarda Barbosa Fernandes	Doctoral Program in Materials Engineering	SFRH/BD/147938/2019	Ongoing
Eduardo Ínsua Pereira	PhD in Optometry and Vision Science, UMinho	OWN	Ongoing
Eduardo Teixeira	PhD Biomedicine (UBI)	OWN	Ongoing
Estela Marisa oliveira Carvalho	Doctoral Program in Materials Engineering	SFRH/BD/145455/2019	Ongoing
Filipe da Costa Correia	Doctoral Program in Materials Engineering	SFRH/BD/111720/2015	Ongoing
Gonçalo Filipe Santos Catarina	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/138806/2018	Ongoing
Hugo Higino de Barros Machado Martins Salazar	Doctoral Program in Materials Engineering	SFRH/BD/122373/2016	Ongoing
Ícaro Jael Mendonça Moura	Doctoral Program in Physics (MAP-Fis)		Completed
Iran Gomes da Rocha Segundo	Doctoral Program in Materials Engineering	SFRH/BD/137421/2018	Ongoing
Irina Soraia Rainho Rio	Doctoral Program in Materials Engineering	2020.04431.BD	Ongoing
Isabel Alves Lopes	Doctoral Program AdvaMTech	PD/BD/143034/2018	Ongoing
Jessica Gomes	PhD in Optometry and Vision Science, UMinho	UMINHO/BI/420/2018	Ongoing
Jivago Serrado Gomes Aguiar Nunes	Doctoral Program in Materials Engineering	SFRH/BDE/103649/2014	Completed
Joana Margarida Fernandes da Silva Ribeiro	Doctoral Program in Materials Engineering	SFRH/BD/147221/2019	Ongoing
João Carlos Pacheco Barbosa	Doctoral Program in Materials Engineering	SFRH/BD/140842/2018	Ongoing
João Luís Rodrigues Teixeira	Doctoral Program in Materials Engineering	SFRH/BD/141642/2018	Ongoing
João Miguel Peixoto Oliveira	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/146886/2019	Ongoing
João Pedro dos Santos Pires	Doctoral Program in Physics (MAP-Fis)	PD/BD/142774/2018	Ongoing
José David Castro	Doctoral Program in Materials Engineering	UMINHO/BI/420/2018	Ongoing
José Diogo Guimarães	Doctoral Program in Physics (MAP-Fis)		Ongoing
Juliana Filipa Gouveia Marques	Doctoral Program in Materials Engineering	SFRH/BD/112868/2015	Ongoing

Juliana Oliveira	Doctoral Program in Materials Engineering	SFRH/BD/98219/2013	Completed
Laura Moreno	PhD in Optometry and Vision Science, UMinho	OWN	Ongoing
Liliana Sofia Correia Fernandes	Doctoral Program in Materials Engineering	SFRH/BD/145345/2019	Ongoing
Lina María Rodríguez Cely	PhD in Optometry and Vision Science, UMinho	OWN	Ongoing
Luísa Fialho	SURFPROTEC - Programa de Doutoramento Nacional em Engenharia e Proteção de Superfícies	UMINHO/BD/31/2016	Ongoing
Marco Rodrigues	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/118684/2016	Ongoing
Maria Manuela Carvalho Proença	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/137076/2018	Ongoing
Marta Adriana Félix Forte	Doctoral Program AdvaMTech	PD/BD/128491/2017	Ongoing
Marta Sofia Vilela Barreira Teixeira	Doctoral Program Applied Chemistry	2020.04975.BD	Ongoing
Maurício Quintela	Doctoral Program in Physics (MAP-Fis)		Ongoing
Miguel Alexandre Martins Franco	Doctoral Program in Materials Engineering	SFRH/BD/145741/2019	Ongoing
Nelson Miguel Macedo da Silva Pereira	Electronics and Computers Engineering Doctoral Program	SFRH/BD/131729/2017	Ongoing
Nélson José Fernandes Castro	Ph.D. - Graphic Design and Engineering Projects	BCMaterials	Completed
Patrícia Alexandra Pereira da Silva	Doctoral Program in Molecular and Environmental Biology	2020.08235.BD	Ongoing
Patrícia Daniela Cabral da Silva	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/128579/2017	Ongoing
Pedro Lima Ramos	Double Degree - Linnaeus University and Univeristy of Minho PhD in Biomedical Sciences /PhD Mathematics	SFRH/BD/119420/2016	Ongoing
Pedro Tiago Maia dos Reis de Jesus	PhD in Optometry and Vision Science, UMinho	OWN	Ongoing
Pelsin Demir	PhD in Optometry and Vision Science, UMinho	Industrial PhD	Ongoing
Rafaela Marques Meira	Doctoral Program in Materials Engineering	SFRH/BD/148655/2019	Ongoing
Ricardo Daniel Pereira da Costa	Doctoral Program in Science and Engineering of Polymers and Composites		Completed
Ricardo Jorge Brito Gonçalves Pereira	Doctoral Program in Materials Engineering	SFRH/BD/140698/2018	Ongoing
Ricardo José da Silva Lima	Doctoral Program in Materials Engineering	2020.07010.BD	Ongoing
Rita de Magalhães Policia	Doctoral Program in Materials Engineering	2020.07956.BD	Ongoing
Rita Ferreira	Leaders for Technical Industries	SFRH/BDE/110654/2015	Ongoing
Salmon Landi Júnior	PhD In Sciences Physics	CAPES	Completed
Salomé Pereira	PhD in Optometry and Vision Science, UMinho		Ongoing

Sérgio Abílio Pereira Gonçaves	Electronics and Computers Engineering Doctoral Program	UMINHO/BI/337/2019	Ongoing
Sérgio Rafael da Silva Veloso	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/144017/2019	Ongoing
Sylvie Ribeiro	Doctoral Program in Materials Engineering	SFRH/BD/111478/2015	Completed
Telma Bezerra Soares	Doctoral Program in Molecular and Environmental Biology	SFRH/BD/138678/2018	Ongoing
Telma Campos Domingues	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/08181/2020	Ongoing
Teresa Isabel Marques de Almeida	Doctoral Program in Materials Engineering	SFRH/BD/141136/2018	Ongoing
Tiago Alves Queirós	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/150646/2020	Ongoing
Tiago André Rodrigues Marinho	Doctoral Program in Materials Engineering	SFRH/BD/140242/2018	Ongoing
Veniero Lenzi	PhD In Sciences Physics	SFRH/BD/128666/2017	Completed
Vera Lucia Alves Carneiro	PhD in Optometry and Vision Science, UMinho		Ongoing
Vítor Filipe Henriques da Silva	Doctoral Program in Industrial Electronic Engineering	SFRH/BD/137529/2018	Ongoing
Viviana Lima de Sousa	Doctoral Program in Materials Engineering	SFRH/BD/143750/2019	Ongoing

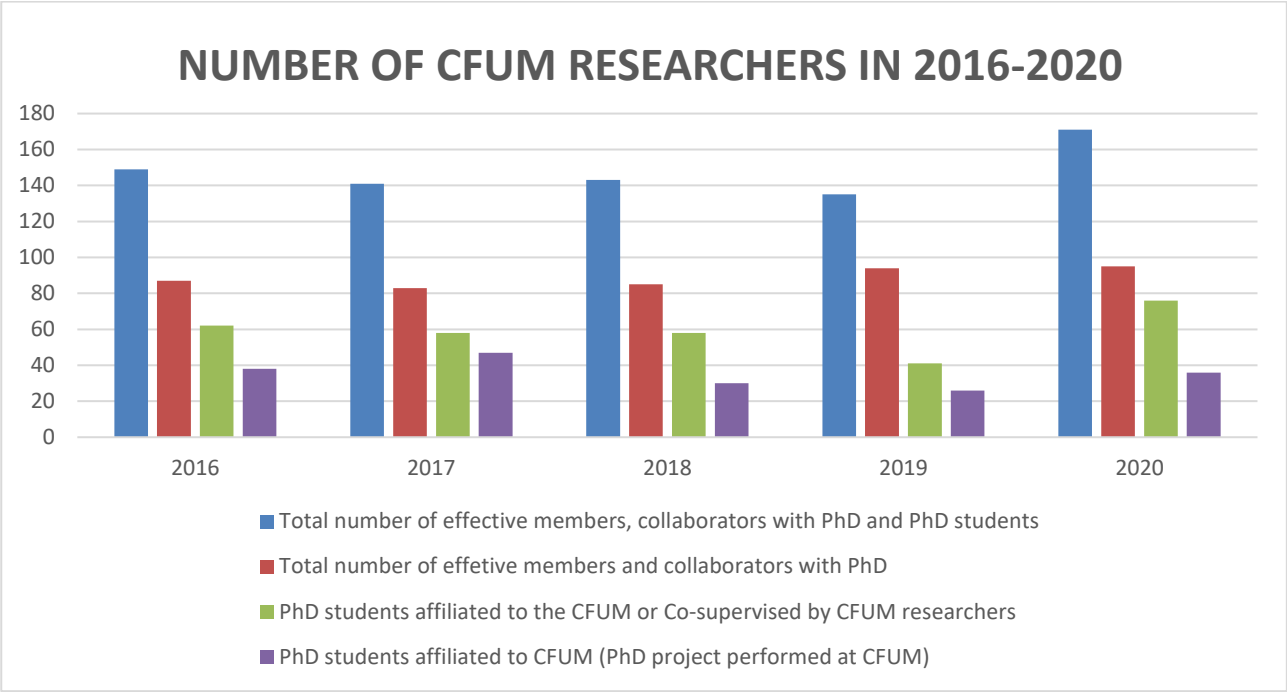
Advisory Board

- 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 PhD studentsin the last five years

3. Strategic Research Lines

Strategic Research Lines	Coordinator
Assessment and enhancing visual performance	José Manuel Gonzalez Meijome (until June) / Maria Madalena da Cunha Faria de Lira (from June)
Physics of quantum materials and bionanostructures	Paulo José Gomes Coutinho
Functional and smart materials and surfaces for advanced applications	Martin Andritschky (until June)/Carlos José de Macedo Tavares (from June)

4. Facilities and Infrastructure

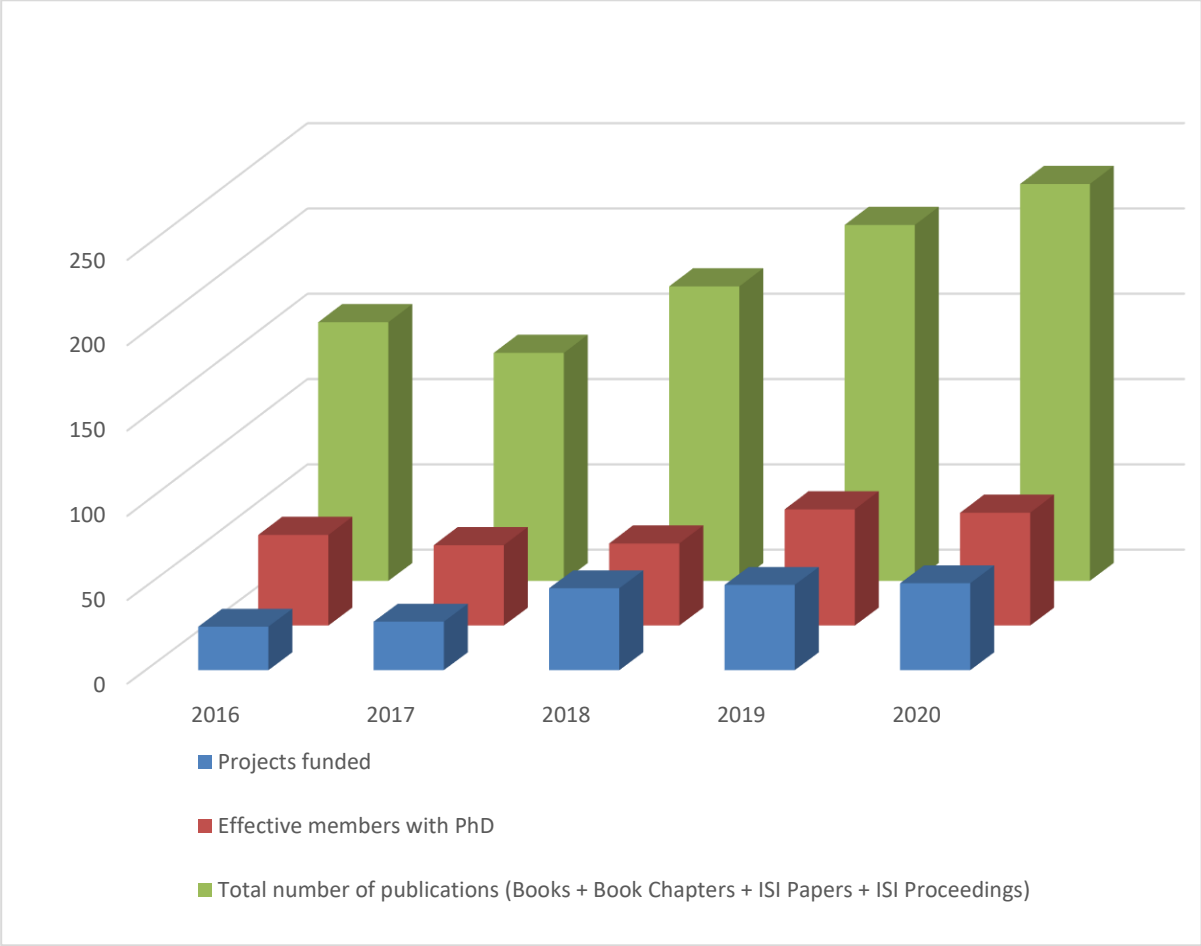
4.1 Research Laboratories

Laboratory – location	Research Line	Responsable
Biophysics – Gualtar	Line 2	Paulo José Gomes Coutinho
Ceramics Research – Azurém	Line 3	Mário António Caixeiro de Castro Pereira
Computational Physics – Gualtar	Line 3	Luís Silvino Alves Marques
Corrosion and electrochemical testings – Azurém	Line 3	Sandra Maria Fernandes Carvalho
Crystal Growth – Gualtar	Line 2	Etelvina de Matos Gomes
Doelectric Properties – Gualtar	Line 2	Bernardo Gonçalves Almeida
Electromechanical properties of materials – Azurém	Line 3	Senen Lanceros-Mendez
Femtosecond Laser Spectroscopy –Gualtar	Lina 2	Michael Scott Belsley
Functional Coatings I – Azurém	Line 3	Martin Andritschky
Functional Coatings II – Azurém	Line 3	Luís Manuel Fernandes Rebouta
Functional Coatings III – Azurém	Line 3	José Filipe Vilela Vaz
Infrared Spectroscopy – Gualtar	Line 2	Luís Manuel Gomes Vieira
Magnetic and Electromechanical Properties – Gualtar	Line 2	Bernardo Gonçalves Almeida
Materials Processing – Azurém	Line 3	Stanislav Lazarov Ferdov
Microtopography – Gualtar	Line 3	Manuel Filipe Pereira da Cunha Martins Costa
Visual Optics and Ophthalmic Instrumentation – Gualtar	Line 1	Sandra Maria Braga Franco
Optoelectronics – Azurem	Line 3	Carlos José de Macedo Tavares
Photoconductivity – Gualtar	Line 2	Maria de Fátima Guimarães Cerqueira
Photophysics I – Gualtar	Line 2	Elisabete Maria dos Santos Castanheira Coutinho
Photophysics II – Gualtar	Line 2	Elisabete Maria dos Santos Castanheira Coutinho
Preparation – Azurém	Line 3	Sandra Maria Fernandes Carvalho
Preparation I – Gualtar	Line 2	Elisabete Maria dos Santos Castanheira Coutinho
Preparation II – Gualtar	Line 3	Maria de Jesus Matos Gomes
Raman Spectroscopy and Photothermal Measurements – Gualtar	Line 3	Francisco José Machado de Macedo
Research in Clinical and Experimental Optometry – Gualtar	Line 1	Jorge Manuel Martins Jorge/ José Manuel González Meijome
Science of Vision and Colour – Gualtar	Line 1	João Manuel Maciel Linhares
Surface analysis – Azurem	Line 3	José Filipe Vilela Vaz
Thin Films I – Gualtar	Line 3	Maria Jesus Matos Gomes
Thin Films II – Gualtar	Line 3	Mário António Caixeiro de Castro Pereira
Visual Rehabilitation – Gualtar	Line 1	António Manuel Gonçalves Baptista
Electrofisiology	Line 1	José Manuel González Meijome / Paulo Rodrigues Botelho Fernandes
Applied Optics Laboratory	Line 2	Eduardo Nunes Pereira
Raman Imaging and 2D Materials and Devices - INL	Line 2	João Pedro dos Santos Hall Agorreta de Alpuim

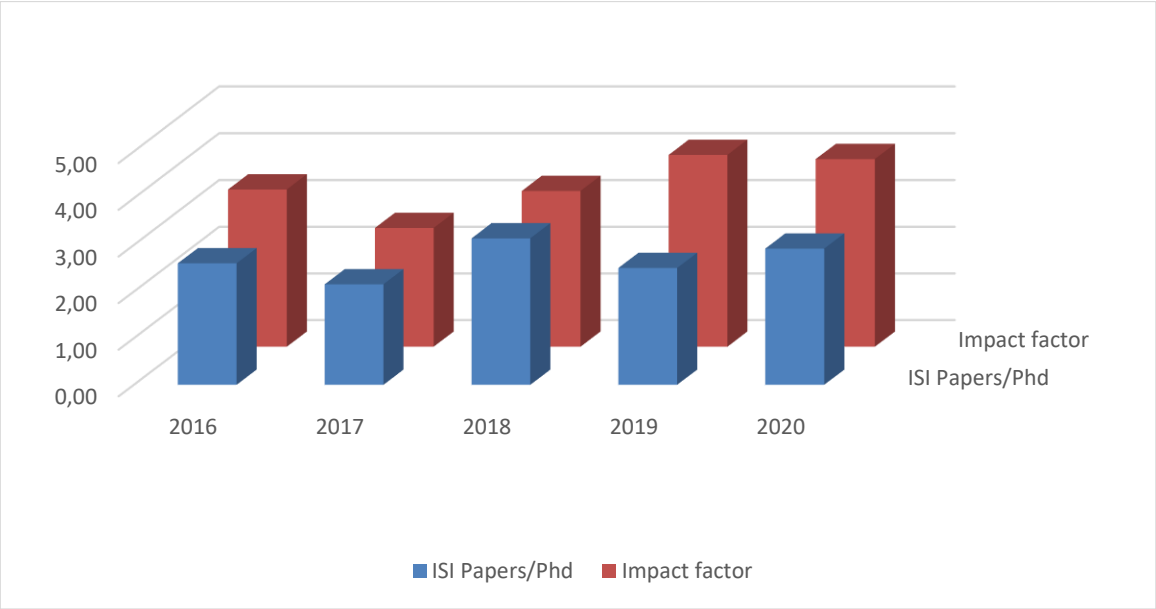
5. Indicators of the Centre Performance

5.1 Publications

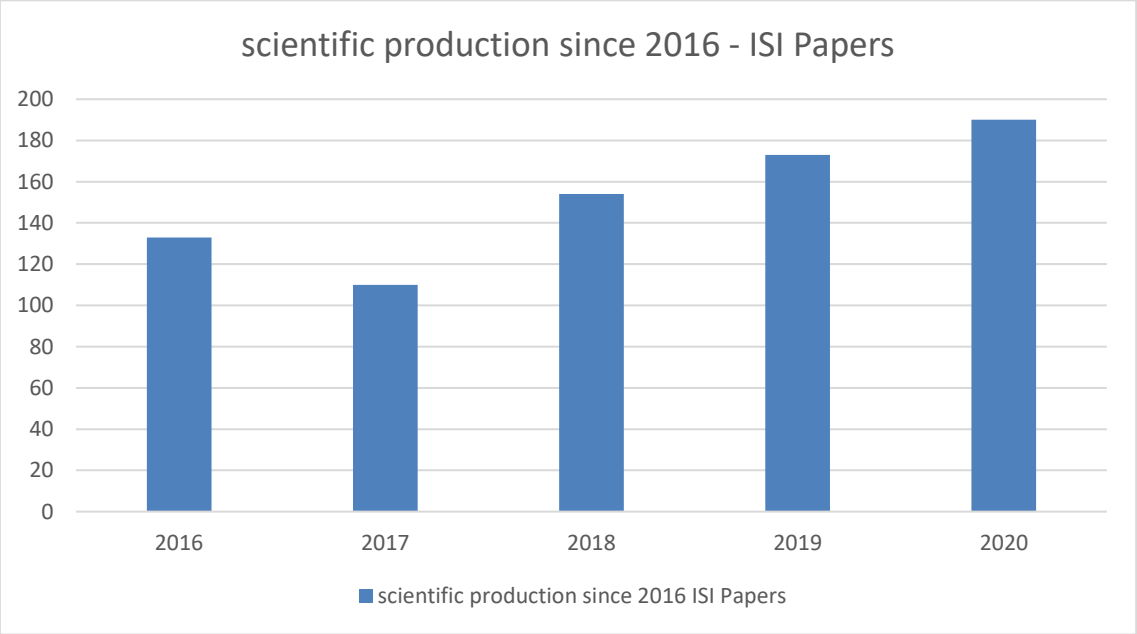
Publications	Number
ISI papers (regular journal articles/ conference journal articles)	190/ 17
Books (Book / edited)	4/2
Book chapters	20
Patents (national /international)	2/5
Oral Presentations in International Conferences (total/by invitation)	26/22



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



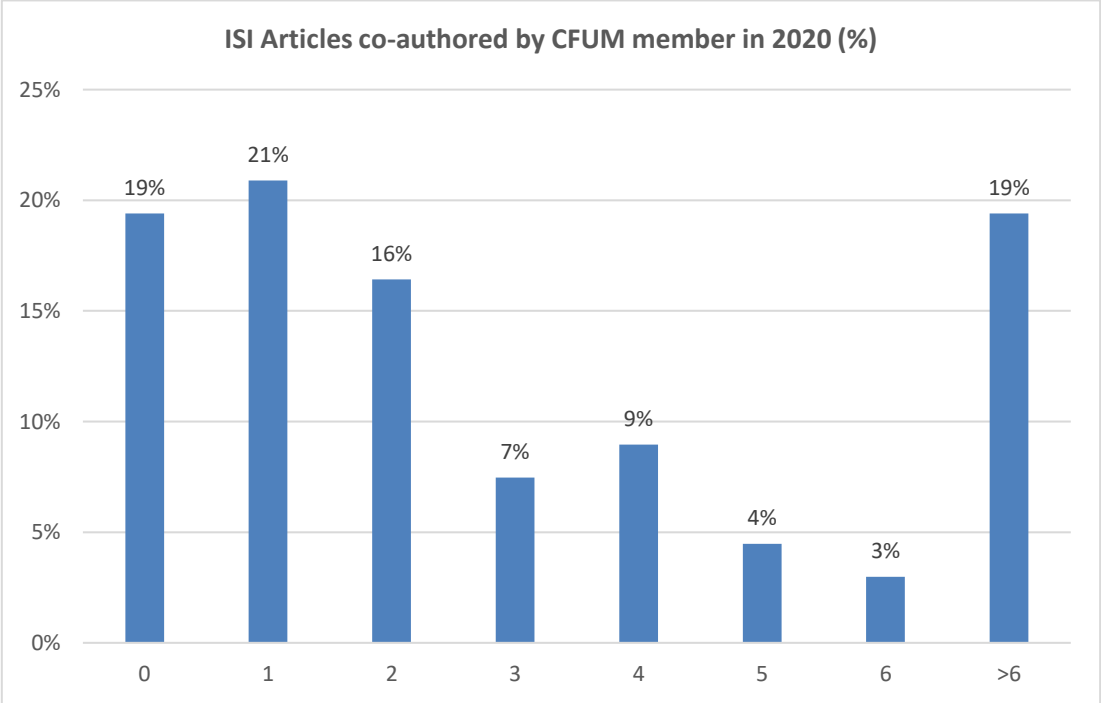
Graph 3: Number of journal articles published (per effective member with PhD) and average impact factor os journals where the articles were published



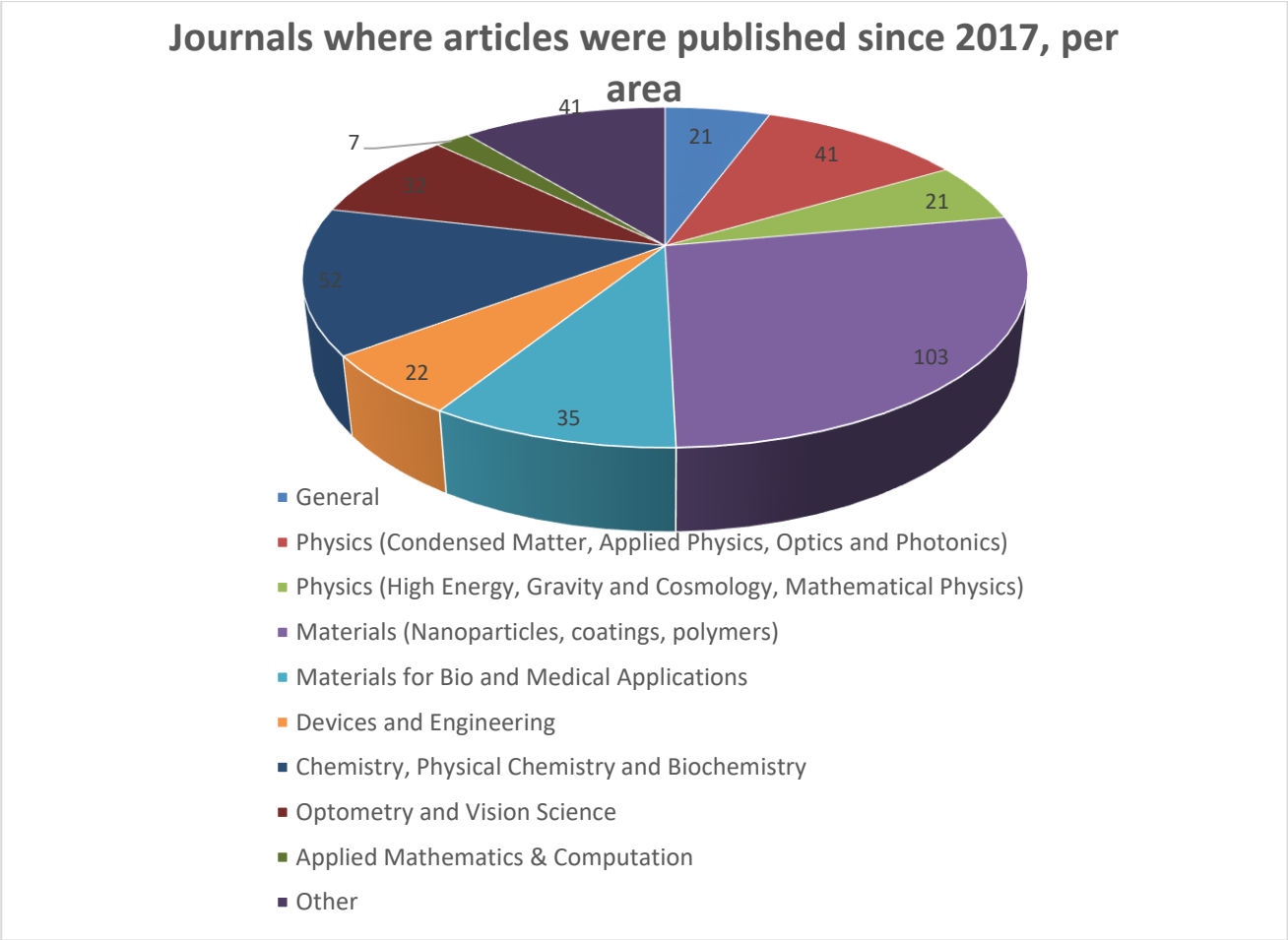
Graph 4: Number of journal articles published

Box 1: Global data on Centre's publications and citations from ISI Web database

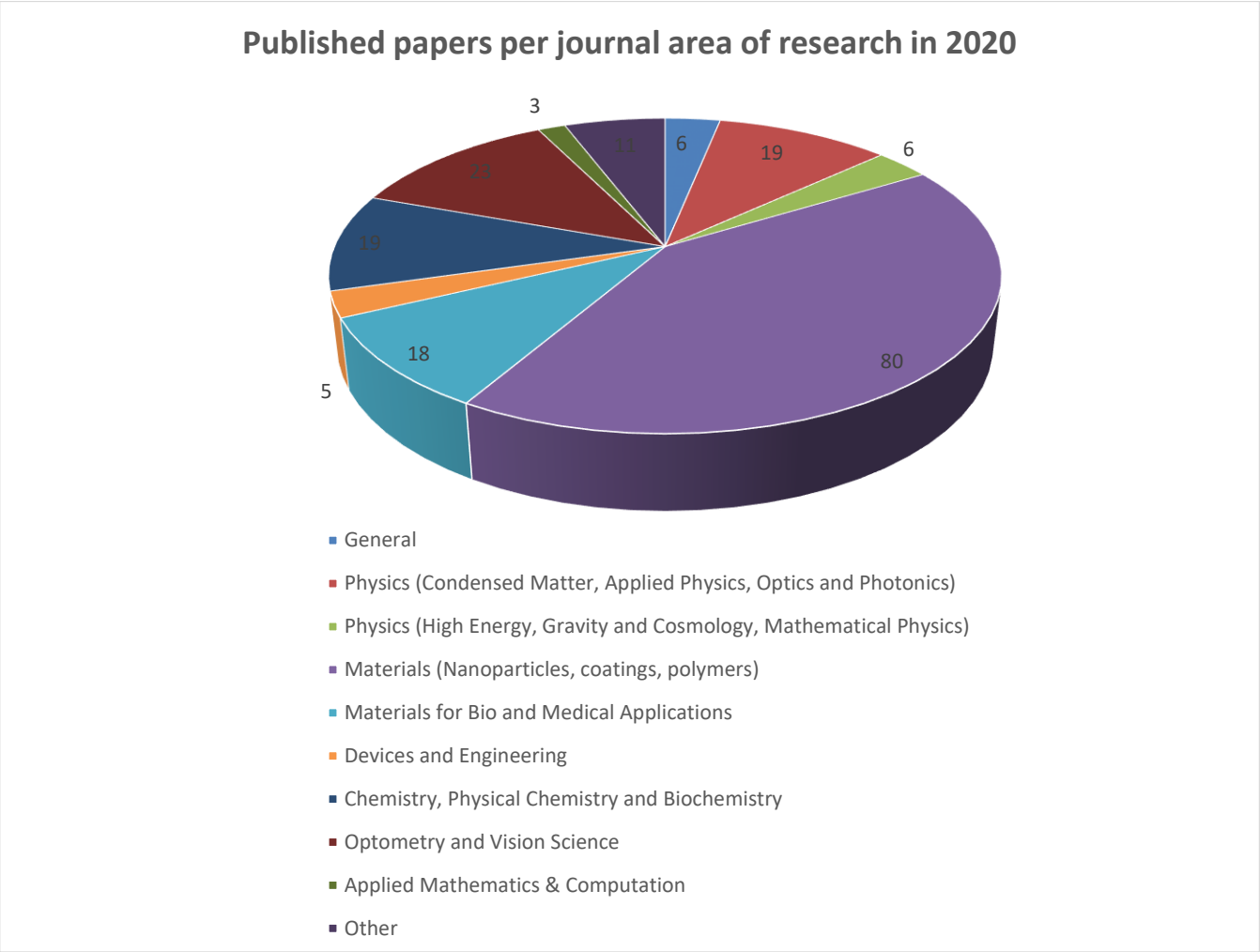
Source:
http://apps.webofknowledge.com/CitationReport.do?product=UA&search_mode=CitationReport&SID=C6b9gcOPCAQbIJBWZ6f&page=1&cr_pqid=11&viewType=summary



Graph 5: Number of ISI articles co-authored by a PhD member in 2019; statistical frequencies



Graph 6: Journals where articles were published since 2017, per area



Graph 7: Published papers per journal area of research in 2020

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

Colloquia (organised in cooperation with LIP-Minho)

Black holes and the 2020 Nobel Physics Prize - Colloquium
Carlos Herdeiro, Research Coordinator, Mathematics Department, University of Aveiro.
December 9th 2020, Online

Data Science and Machine Learning: a short insight - Colloquium
Stéphane Clain, Departamento de Matemática e Centro de Física, Escola de Ciências, Universidade do Minho, Portugal. March 4th 2020

Scientific Conferences organized by members of the Centre of Physics

- **International**

EOSAM 2020, European Optical Society Annual Meeting, TOM 13-Advances and Applications of Optics and Photonics, 7 – 11 September 2020, Porto, Portugal - Mikhail Vasilevskiy - Member of the Program Committee.

JEMS 2020 - Joint European Magnetic Symposia, 7-11 December 2020, Lisboa, Portugal - Bernardo Almeida,Member of National Advisory Committee.
JEMS 2020 - Joint European Magnetic Symposia, 7-11 December 2020, Lisboa, Portugal - Bernardo Almeida, Chairman of session 16 - Magnetic thin-films, interfaces and multilayers.

European Optical Society Annual Meeting 2020, EOSAM2020, Porto Filipe Costa (Portugal), September 7-11, 2020. Online

17th International Conference on Hands-on Science, Science Education. Filipe Costa Discovering and understanding the wonders of Nature, Viana do Castelo, Portugal, July 13-17, 2020. Online

- **National**

15ª JORNADA TÉCNICO-CIENTÍFICA DE CONTACTOLOGIA (CONTACTUM2020) Universidade do Minho. Braga (Portugal), February 4th, 2020

3ª International Summer School VisSciUM2020. Universidade do Minho. Braga (Portugal), June 19, 26-July 3; July 10,17,24; July 31, August 7,14.

Colloquia of QuantumMatter@PT network - Bruno Amorim – Organizer (involving national researchers working in the field of quantum materials):

- QM@PT - Quantum Colloquium - Adolfo G. Grushin, "Amorphous Topological Insulators: Theory and Experiment", 29 October 2020 (online).
- QM@PT - Quantum Colloquium - Rui E. Ferreira da Silva, "High Harmonic Spectroscopy of Strongly Correlated and Topological Materials", 3 December 2020 (online).

FISICA 2020 – 22ª Conferência Nacional de Física, Bernardo Almeida, 2-6 September 2020, Member of the Scientific Committee.

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

Prémio Essilor Inovação e Investigação em Óptica. Portugal. José Méijome.

2nd Prize Santa Casa Challenge 2020 – Spin-off "SPM Nanosolutions, Lda. - Superparamagnetic Nanotechnological Solutions for Advanced Therapies and Environment", Team: Ana Rita Rodrigues, Beatriz Cardoso, Carlos Magalhães and Ricardo Fernandes, supervised by Paulo J. G. Coutinho and Elisabete Castanheira Coutinho, Santa Casa da Misericórdia, April 2020.

1st Prize Start Up Your Point – Project BPatch: Bionanostructured Patch; Team: Ana Rita Pereira Caldas, Maria João Fernandes Faria, Eduarda Fernandes, Carla Martins Lopes and Marlene Lúcio, StartUp Braga, Braga, October 2020

Start Up Vouchers Fellowship 2020 - Project BPatch: Bionanostructured Patch; Team: Ana Rita Pereira Caldas, Maria João Fernandes Faria, Eduarda Fernandes, Carla Martins Lopes and Marlene Lúcio, IAPMEI, March 2020.

Biophysical characterization of antioxidants-stratum corneum biomimetic model interactions: towards a new solution for drug screening process – Project team: Marlene Lúcio and Eduarda Fernandes – awarded with beamtime and support (travel and accommodation expenses) by Central European Research Infrastructure Consortium (CERIC) at Elettra-Sincrotrone Trieste, November 2020.

Certificate of recognition from the International Center for Diffraction Data (ICDD, USA) for significant contribution of 1 pattern to the Powder Diffraction File – Release 2020. Team: Stanislav Ferdov.

Second PDF pattern (I10345) accepted for publication in Powder Diffraction File – Release 2020. Team: Stanislav Ferdov.

Participation in Journal Editorial Boards

António Queirós Pereira
- Journal of Optometry – Editorial Board
- Journal of Ophthalmology – Editorial Board
- Journal of Clinical Medicine – Guest Editor – (Special Issue New Frontiers in Myopia Progression in Children)

Sérgio Nascimento
Topical Editor of the Journal of the Optical Sociery of America

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

Jorge Jorge
- Journal of Optometry - Editorial Board

Paulo Fernandes
- Journal of Ophthalmology – Academic Editor

Nuno Peres
- Co-Editor of the journal Europhysics Letters (April 2013 - March 31, 2020).
- Member of the Editorial Board of the journal Applied Sciences (from Jan. 2018). Panel members in: https://www.mdpi.com/journal/applsci/sectioneditors/applied_nanosciences.

Mikhail Vasilevskiy
- Member of the Editorial Board of the journal Applied Sciences (MDPI), section “Optics and Lasers”.

Paulo J. G. Coutinho
– Guest Editor of the journal Materials (MDPI), Special Issue “Development of Magneto Nanoparticles for Biomedical and Environmental Applications”.

Bernardo Almeida, Elisabete M. S. Castanheira Coutinho
– Co-editors of the journal Materials (MDPI), Special Issue “Development of Magneto Nanoparticles for Biomedical and Environmental Applications”.

Joel Borges
– Guest Editor of the journal Materials (MDPI), Special Issue “Thin Films for Sensing Applications”.
– Topic Editor of the journal Frontiers in Nanotechnology, Topic: Nanoplasmonic Thin Films: From Plasmon-Enhanced Light-Matter Interactions to Sensing Applications.

Marlene Lúcio
- Editorial board member of Biophysica; https://www.mdpi.com/journal/biophysica/editors
- Guest Editor of the journal Pharmaceutics (MDPI), Special Issue “Overcoming Physiological Barriers Using Lipid Nanosystems”.

Elisabete M. S. Castanheira Coutinho
- Guest Editor of the journal Materials (MDPI), Special Issue “Magnetic Nanoparticle-Based Materials: Synthesis and Biomedical Applications”.

Bernardo Almeida
– Editorial Director of Gazeta de Física.

Carlos José Macedo Tavares
- Special Issue Editor, "Photocatalytic Thin Films", A special issue of Coatings (ISSN 2079-6412), https://www.mdpi.com/journal/coatings/special_issues/photocatal_thin_film
Coatings, journal, MDPI, Editorial Board Member, https://www.mdpi.com/journal/coatings/editors

Manuel Filipe M Costa:
Óptica Pura y Aplicada, OPA - Editorial Board, International Advisor.
Advances in Laser Optics and Photonics. - Editorial Board
SAGE Open – Associate Editor
Photonics – Guest Editor, Special Issue
Sustainability – Guest Editor, Special Issue
Sensors – Guest Editor, Special Issue

V. F. Cardoso
- Polymers, MDPI. Guest Editor

Pedro Libanio de Abreu Martins
MDPI Materials - Guest Editor

Daniela Correia
- Journal of Nanomaterials (MDPI)- Guest Editor

Clarisse Ribeiro:
- Molecules - Editorial Board
- Materials Guest Editor

Carlos M. Costa:
- Energies - Editorial Board;
- Nanomaterials - Editorial Board;
- International Journal of Molecular Sciences – Editorial Board

Pedro Manuel Martins
- Polymers (MDPI), Guest Editor

Pedro Costa
Materials, Guest Editor

Senentxu Lanceros-Mendez
Editorial Board Energies, Nanomaterials, International Journal of Molecular Sciences, Polymers, Materials; Frontiers in Bioengineering and Biotechnology, Heliyon, Elsevier, Polymer Crystallization (Wiley)

Sandra Carvalho
- Editorial Board of Materials (MDPI)
- Editorial Board of Dataset Papers in Materials Science
- Editorial Board of ISRN Nanomaterials.
- Editorial Board Advances in Nanoscience and Nanotechnology

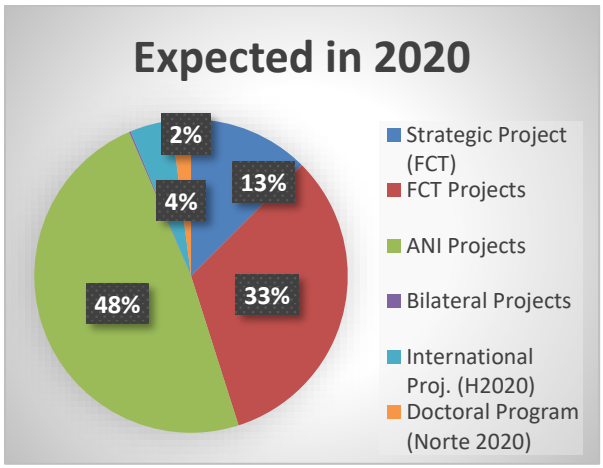
Joaquim Carneiro
- Coatings (MDPI, ISSN: 2079-6412 – IF: 2.436) – Member of the Editorial Board
- International Journal of Photoenergy (Hindawy, ISSN: 1110-662X – IF: 1.880) - Member of the Editorial Board
- Current Smart Materials (ISSN: 2405-4658) - Member of the Editorial Board
- Solids (MDPI, ISSN 2673-6497) – Member of the Editorial Board

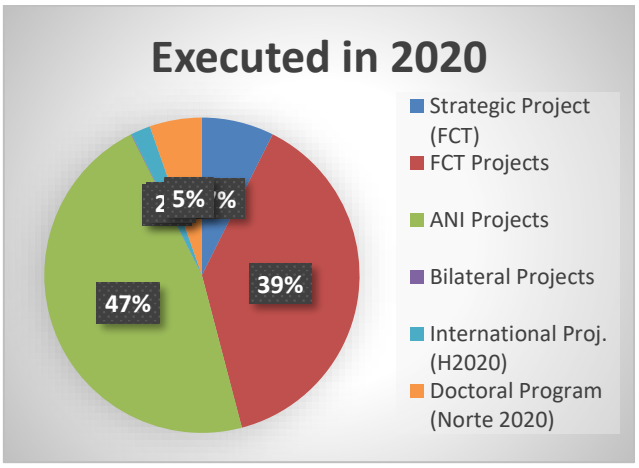
5.4 PhD and MSc degree leading projects at the Centre

MASTER THESES	COMPLETED	20	***total***
PH.D. THESES (PERFORMED AT CFUM / (CO-) SUPERVISED BY A CFUM MEMBER)	ONGOING	36/40	76
	COMPLETED	6/7	13

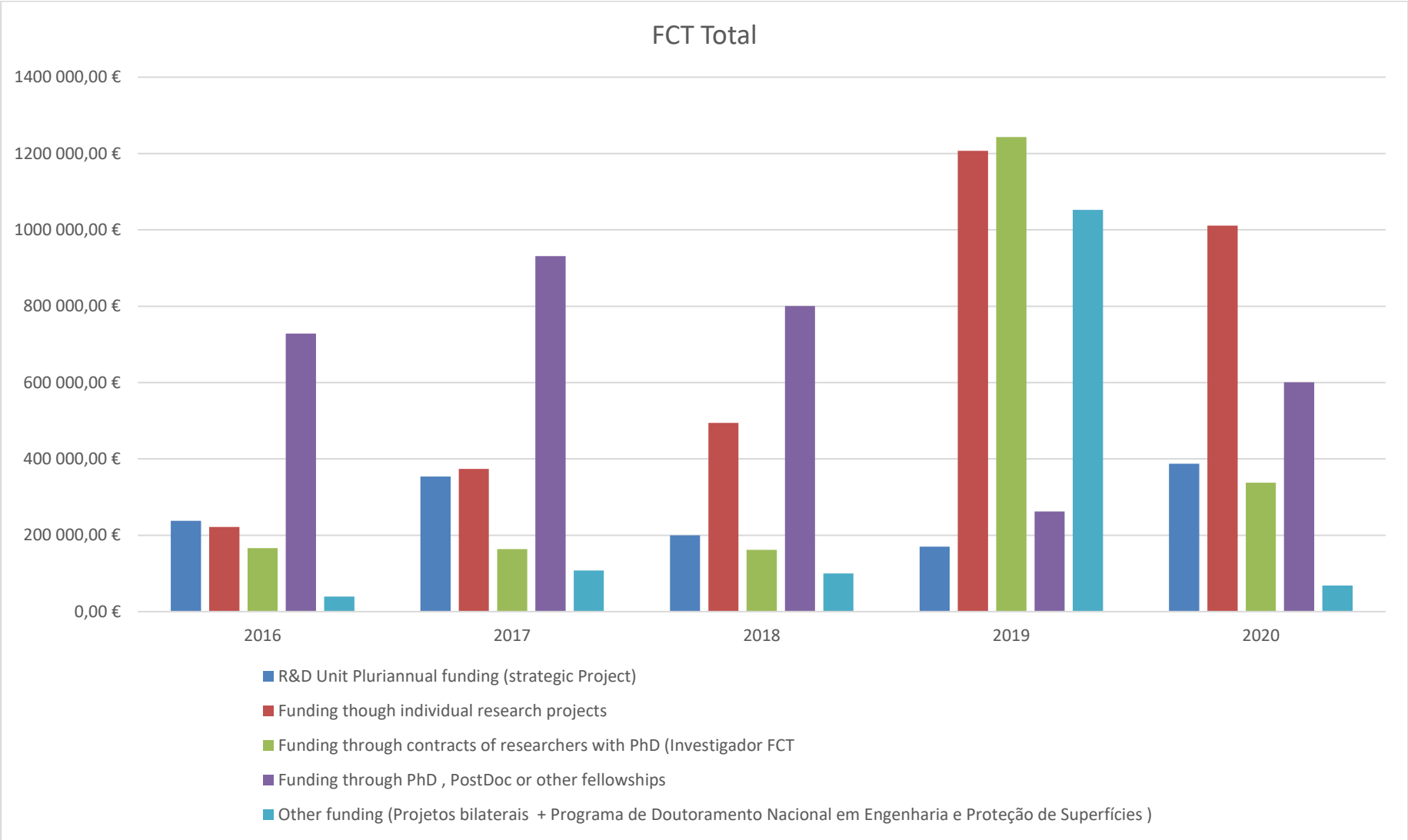
5.5 Funding Summary

	Expected in 2020	%	Received in 2020	%	Executed in 2020	Number of ongoing projects
Strategic Project (FCT)	387 308,31 €	12,49%	116 192,49 €	6,88%	147 986,25 €	2
FCT Projects	1 011 136,00 €	32,61%	572 151,81 €	33,88%	768 605,04 €	27
ANI Projects	1 502 274,54 €	48,44%	796 734,10 €	47,17%	931 381,00 €	15
Bilateral Projects	5 000,00 €	0,16%	5 000 €	0,30%	1 282,08 €	3
International Proj. (H2020)	131 863,31 €	4,25%	173 762,21 €	10,29%	40 165,79 €	4
Doctoral Program (Norte 2020)	63 450,00 €	2,05%	25 101 €	1,49%	106 906 €	1
Total	**3 101 032,16 €**	**100%**	**1 688 941,54 €**	**100%**	**1 996 326,25 €**	**52**

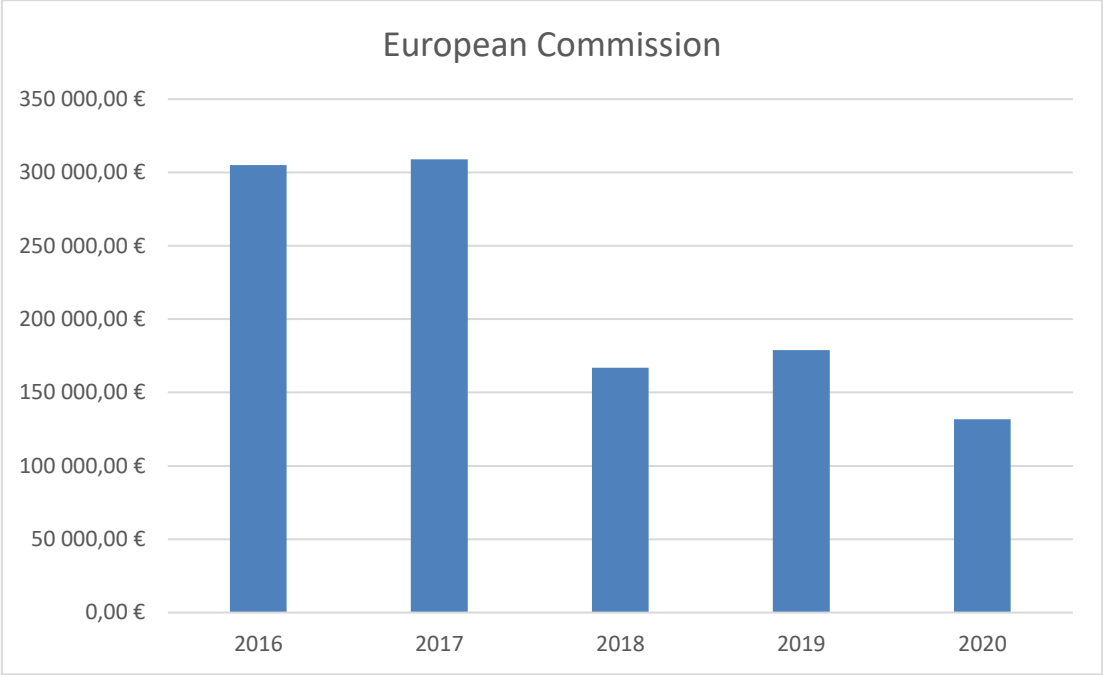




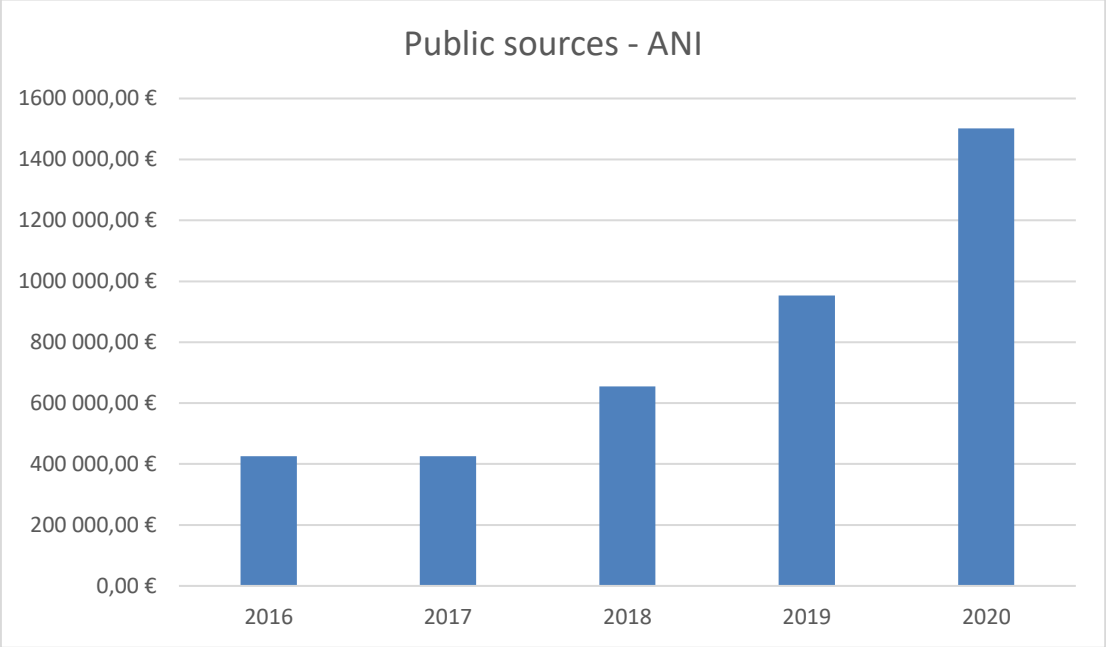
Graph 8: Funding expected in 2020 according to projects' contracts **Graph 9: Funding executed in 2020**



Graph 9: Funding history 2016-2020 (Contracted with FCT)



Graph. 10: Funding history 2016-2020 (Contracted European Commission projects)



Graph. 11: Funding history 2016-2020 (contracted ANI projects)

5.6 Scientific Production Indicators by Research Line

	Line 1	Line 2	Line 3	TOTAL
N° Effective Members with Ph.D. (at 31/12)	11	30	26	67
Colaborators with PhD – staff members	3	5	6	14
Other Colaborators with PhD	0	4	10	14
Books (Book/Edited)	0/0	2/0	2/2	4/2
Book Chapters	5	1	14	20
Regular articles published in ISI Journals	34	55	101	190
Average Journal Impact factor	2.40	4.62	4.17	4.04
Conference Proceedings (ISI)	5	4	8	17
Invited Talks in Scientific Conferences (International/National)	11/2	6/0	5/0	22/2
PhD Theses concluded	0	4	9	13
PhD Theses in progress	14	25	37	76
Externally funded R&D projects (National sourses: FCT, ANI)*	1	17	25	43
Externally funded R&D projects (International sources: H2020)	0	2	2	4
Bilateral Cooperation Projects	0	0	3	3
Collaboration Projects with Industry	0.667	0.667	0.667	2
Patents (National/International)	0/0	1/4	1/1	2/5

*PE not included

6. Description of the Main Activities in 2020 by Research Line

6.1 Assessment and enhancing visual performance

6.1.1 Researchers

Principal investigator	José Meijome (until June) / Maria Madalena da Cunha Faria de Lira (from June)
Members	**Effective members** António Filipe Teixeira Macedo António Manuel Gonçalves Baptista António Manuel Marques Queirós Pereira Daniela Patricia Lopes Ferreira João Manuel Maciel Linhares Jorge Manuel Martins Jorge José Manuel González Méijome Maria Madalena da Cunha Faria de Lira Paulo Rodrigues Botelho Fernandes Sandra Maria de Braga Franco Sérgio M. Cardoso Nascimento **Colaborators with PhD – staff members** Ana Maria Fernandes de Pinho Dias José Alberto Díaz Rey Vasco Miguel Nina de Almeida **PhD students (supervised or co-supervised by CFUM researchers)** Alshaarawi M. A. Salem Ana Isabel Carvalho Amorim de Sousa Andreia Esteves Gomes Clara Maria dos Santos Pereira. Eduardo Ínsua Pereira Eduardo Teixeira Jessica Gomes Laura Moreno Lina María Rodríguez Cely Pedro Lima Ramos Pedro Tiago Maia dos Reis de Jesus Pelsin Demir Salomé Pereira Vera Lucia Alves Carneiro

6.1.2 Brief description of the scientific work carried out within the Research Line in 2020

In the Research Line in Assessment and Enhancement of Visual Performance, current areas of expertise continue to cover research in fundamental and applied topics focused on binocular vision, color science, instrumentation, ocular surface and contact lenses, refractive error development, visual electrophysiology, visual rehabilitation and vision under challenging conditions.

Research results in optometry and contact lenses field included the evaluation of the impact of overnight orthokeratology on accommodative, retinal, refractive, biometric and corneal topographic parameter in myopic subjects and the evaluation of clinical findings with scleral lens wear. Color vision research outcomes were focused on the assessment of color vision and human perception of natural scenes and paintings for normal and deficient chromatic observers. The acquired knowledge was applied in the perception of colors in paintings and in the simulation of the removal or the paintings' varnish layer and initial painting restoration. Visual rehabilitation section investigated on the impact of visual impairment in productivity and other socioeconomic aspects of the visual deficiency. Additionally, relevant results have been produced in the area of reading assessment and other psychological aspects related with vision. Visual electrophysiology strategies were applied to different areas of visual correction and to the computational modelization of the retinal response to visual stimuli.

Following the trends of previous years there has also been an increase in the number of PhD Students in the Doctoral Program in Optometry and Vision Sciences. The same tendency can be observed in the number of Master Students supervised by staff members as it remains high. However, due to the pandemic crisis caused by COVID 19, the number of students who finished their master's thesis was below levels of previous years. For the same reason, the participation of members of the Research Line in international conferences was almost non-existent, with limited participation in on-line events. The organization of the International Conference of Optometry and Vision Science (CIOCV) and other meetings co-organized by research line members had to be postponed.

It is also to be highlighted the level of internationalization in the scientific cooperations, observable in the multinational authorship of the research papers published as well as the close interaction with other national departments and research centers.

In 2020, the participation and coordination of members of this line in the Opto-Biomechanical Eye Research Network (OBERON Project 956720) Marie Skłodowska-Curie Actions (MSCA) stands out. This will certainly bring many opportunities and bring Portuguese Optometry closer to large scientific groups at the European level hoping that from here our interaction with these and other groups will rise, placing Portuguese Optometry at the center of an interdisciplinary research network opening doors to new approaches funding and cooperation opportunities.

6.1.3 Future research summary

The future development of the research activity will continue to be focused in the most of the referred activities. Areas to be developed in the close future in the Research Line are expected to be focused on several interdisciplinary areas involving fundamental and applied aspects of visual evaluation, compensation, rehabilitation and enhancement of human visual capabilities. It is expected that the members of the research line are able to successfully apply to the coming national funding project calls and it is expected that these financing allow the group to strength the technical capabilities and also develop new partnerships. Current strategies under development within this research line should allow to create laboratorial facilities of access to all members where newer instrumentation can be acquired and allocated.

It is also expected an extension in research and an increase of publications in the area of sports and optometry as well as in the area of environmental conservation with the study of recycling of contact lens materials.

The group should also keep in the positive aspects of the current publication track record, and continue raising the average impact factor of the journals where they publish as well as the number of citations revealing recognition of his work.

The research line should explore the bridges between the scientific and pedagogical areas, doing efforts to attract highly motivated MSc and PhD students. The opportunities to hire doctoral students and post-doctoral research staff

during 2020 in the context of the strategic funding of the group should be sustained during the coming years under this and other funding schemes.

6.1.4 Publications

6.1.4.1 Regular articles published in ISI/Scopus Journals

A one-year prospective study on scleral lens wear success. Cont Lens Anterior Eye. Macedo-de-Araújo RJ, van der Worp E, González-Méijome JM. 2020 Dec;43(6):553-561. doi: 10.1016/j.clae.2019.10.140.

A Review of Capture-recapture Methods and Its Possibilities in Ophthalmology and Vision Sciences. Ramos PL, Sousa I, Santana R, Morgan WH, Gordon K, Crewe J, Rocha-Sousa A, Macedo AF. Ophthalmic Epidemiol. 2020 Aug;27(4):310-324. doi: 10.1080/09286586.2020.1749286. Epub 2020 May 3. PMID: 32363970.

An independent contribution of colour to the aesthetic preference for paintings. Albers, A.M., Gegenfurtner, K.R., Nascimento, S.M.C. Vision Research, 2020, 177, pp. 109–117. https://doi.org/10.1016/j.visres.2020.08.005

Art through the colors of graffiti: From the perspective of the chromatic structure. Feitosa-Santana, C., Gaddi, C.M., Gomes, A.E., Nascimento, S.M.C. Sensors, 2020, 20(9), 2531. https://doi.org/10.3390/s20092531.

Bifocal and Multifocal Contact Lenses for Presbyopia and Myopia Control. Remón L, Pérez-Merino P, Macedo-de-Araújo RJ, Amorim-de-Sousa AI, González- Méijome JM. J Ophthalmol. 2020 Mar 27;2020:8067657. doi: 10.1155/2020/8067657.

Chromatic changes in paintings of Adriano de Sousa Lopes after the removal of aged varnish, Linhares, J; Cardeira, L; Bailao, A; Pastilha, R; Nascimento, S (2020), CONSERVAR PATRIMONIO, Issue: 34, DOI: 10.14568/cp2018064

Chromatic reintegration in contemporary monochromatic unvarnished paintings: a case study based on artwork from Jorge Martins, Aleixo, M; Bailao, A; Gomes, AE; Linhares, J; San Andres, M; Nascimento, S (2020), GE-CONSERVACION, Issue: 18, DOI: 10.37558/gec.v18i1.817

Clinical Findings and Ocular Symptoms Over 1 Year in a Sample of Scleral Lens Wearers. Macedo-de-Araújo RJ, Amorim-de-Sousa A, van der Worp E, González-Méijome JM. Eye Contact Lens. 2020 Nov;46(6):e40-e55. doi: 10.1097/ICL.0000000000000672.

Comparison of short-term light disturbance, optical and visual performance outcomes between a myopia control contact lens and a single- vision contact lens. García-Marqués JV, Macedo-De-Araújo RJ, Cerviño A, García-Lázaro S, McAlinden C, González-Méijome JM. Ophthalmic Physiol Opt. 2020 Nov;40(6):718-727. doi: 10.1111/opo.12729.

Competencies and Training Needs of the Portuguese Optometrists - A National Inquiry. Carneiro VLA, Jorge J, Journal of optometry, 2020. Publicado: 10.1016/j.optom.2019.12.003

Contrast sensitivity function with soft contact lens wear. Sapkota K, Franco S, Lira M. Journal of Optometry, 2020;13: 96-101. https://doi.org/10.1016/j.optom.2020.01.002 (http://hdl.handle.net/1822/67044)

Cost-effectiveness of basic vision rehabilitation (The basic VRS-effect study): study protocol for a randomised controlled trial, Hernandez-Moreno, Laura; Senra, Hugo; Lewis, Peter; Moreno, Natacha; Linhares, Joao; Santana, Rui; Ramos, Pedro Lima; Marques, Ana Patricia; Macedo, Antonio Filipe, (2020), OPHTHALMIC AND PHYSIOLOGICAL OPTICS, Volume: 40, Issue: 3, DOI: 10.1111/opo.12665

Determining vault size in implantable collamer lenses: preoperative anatomy and lens parameters. Trancón AS, Manito SC, Sierra OT, Baptista AM, Serra PM. J Cataract Refract Surg. 2020;46:728-736. doi: 10.1097/j.jcrs.0000000000000146

Differences between Inferior and Superior Bulbar Conjunctiva Goblet Cells in Scleral Lens Wearers: A Pilot Study. Macedo-de-Araújo RJ, Serramito-Blanco M, van der Worp E, Carracedo G, González-Méijome JM. Optom Vis Sci. 2020 Sep;97(9):726-731. doi: 10.1097/OPX.0000000000001575.

Digital image processing (DIP) as a means of analysis, documentation and monitoring of the corrosion of the carbon steel applied in the sculpture of Goncalo Jardim, Alvarez, Ana Sofia; Linhares, Joao; Bailao, Ana (2020), GE-CONSERVACION, Issue: 17, DOI: 10.37558/gec.v17i1.614

Global trends in myopia management attitudes and strategies in clinical practice - 2019 Update. Wolffsohn JS, Calossi A, Cho P, Gifford K, Jones L, Jones D, Guthrie S, Li M, Lipener C, Logan NS, Malet F, Peixoto-de-Matos SC, González-Méijome JM, Nichols JJ, Orr JB, Santodomingo-Rubido J, Schaefer T, Thite N, van der Worp E, Tarutta E, Iomdina E, Ali BM, Villa-Collar C, Abesamis-Dichoso C, Chen C, Pult H, Blaser P, Parra Sandra Johanna G, Iqbal F, Ramos R, Carrillo Orihuela G, Boychev N. Cont Lens Anterior Eye. 2020 Feb;43(1):9-17. doi: 10.1016/j.clae.2019.11.002.

How Good Are RGB Cameras Retrieving Colors of Natural Scenes and Paintings?-A Study Based on Hyperspectral Imaging, Linhares, JMM; Monteiro, JAR; Bailao, A; Cardeira, L; Kondo, T; Nakauchi, S; Picollo, M; Cucci, C; Casini, A; Stefani, L; Nascimento, SMC, (2020) SENSORS, volume: 20, Issue: 21, DOI: 10.3390/s20216242.

Impact of contact lens materials on the mfERG response of the human retina. Amorim-de-Sousa A, Moreira L, Macedo-de-Araújo R, Amorim A, Jorge J, Fernandes PR, Queirós A, González-Méijome JM. Doc Ophthalmol. 2020 Apr;140(2):103-113. doi: 10.1007/s10633-019-09722-6.

Inflammatory status predicts contact lens discomfort under adverse environmental conditions. Fernández I, López-Miguel A, Martín-Montañez V, Enríquez-de-Salamanca A, Calonge M, González-Méijome JM, González-García MJ. Ocul Surf. 2020 Oct;18(4):829-840. doi: 10.1016/j.jtos.2020.07.015.

Inter-Eye Vault Differences of Implantable Collamer Lens Measured Using Anterior Segment Optical Coherence Tomography. Clinical ophthalmology (Auckland, NZ). Cerpa Manito S, Sánchez Trancón A, Torrado Sierra O, Baptista AMG, Serra PM. 2020;14:3563-3573. doi: 10.2147/opth.s258817

Light distortion of soft multifocal contact lenses with different pupil size and shape. Monsálvez-Romín D, González-Méijome JM, Esteve-Taboada JJ, García-Lázaro S, Cerviño A. Cont Lens Anterior Eye. 2020 Apr;43(2):130-136. doi: 10.1016/j.clae.2019.11.014. Epub 2019 Dec 4.

Near perfect visual compensation for atmospheric color distortions, Gomes, AE; Linhares, JMM; Nascimento, SMC, (2020) COLOR RESEARCH AND APPLICATION, Volume: 45 Issue: 5, DOI: 10.1002/col.22514

Optical Quality and Visual Performance for One Year in a Sample of Scleral Lens Wearers. Macedo-de-Araújo RJ, Faria-Ribeiro M, McAlinden C, van der Worp E, González- Méijome JM. Optom Vis Sci. 2020 Sep;97(9):775-789. doi: 10.1097/OPX.0000000000001570.

Physicochemical stability of contact lenses materials for biomedical applications. Madalena Lira, Cátia Lourenço, Manuela Silva, Gabriela Botelho. Journal of Optometry. Journal of Optometry, 2020;13:120-127. https://doi.org/10.1016/j.optom.2019.10.002

Refractive, biometric and corneal topographic parameter changes during 12 months of orthokeratology. Queirós A, Lopes-Ferreira D, Yeoh B, Issacs S, Amorim-De-Sousa A, Villa-Collar C, González-Méijome J. Clin Exp Optom. 2020 Jul;103(4):454-462. doi: 10.1111/cxo.12976. Epub 2019 Nov 6.

Retinal Response of Low Myopes during Orthokeratology Treatment. Queirós A, Pereira-da-Mota AF, Costa J, Amorim-de-Sousa A, Fernandes PRB, González-Méijome JM. J Clin Med. 2020 Aug 14;9(8):2649. doi: 10.3390/jcm9082649.

TFOS European Ambassador meeting: Unmet needs and future scientific and clinical solutions for ocular surface diseases. Erickson S, Sullivan AG, Barabino S, Begovic E, Benitez-Del-Castillo JM, Bonini S, Borges JS, Brzheskiy V, Bulat N, Cerim A, Craig JP, Cuşnir V, Cuşnir V Jr, Cuşnir V, Doan S, Dülger E, Farrant S, Geerling G, Goldblum D, Golubev S, Gomes JAP, González-Méijome JM, Grupcheva CN, Gündüz ÖU, Horwath-Winter J, Källmark F, Karanadze N, Karcic HH, Karcic S, Kontadakis G, Messmer EM, Mrugacz M, Murphy C, O'Leary OE, Procopciuc V, Pult H, Raus P, Şahin A, Setälä N, Stanila A, Stanila DM, Utheim TP, Vehof J, Versura P, Villani E, Willcox MDP, Wolffsohn JS, Zagórski Z, Zoega GM, Sullivan DA. Ocul Surf. 2020 Oct;18(4):936-962. doi: 10.1016/j.jtos.2020.05.006. Epub 2020 Jun 3. PMID: 32504856.

The Best CCT for Appreciation of Paintings under Daylight Illuminants is Different for Occidental and Oriental Viewers, Nascimento, SMC; Herdeiro, CFM; Gomes, AE; Linhares, JMM; Kondo, T; Nakauchi, S, (2020) LEUKOS, DOI: 10.1080/15502724.2020.1761828.

The conscious experience of color constancy and neural responses to subliminal deviations – A behavioral and EEG/ERP oddball study. Teixeira, M., Nascimento, S., Almeida, V., Amaral, C., Castelo-Branco, M. Consciousness and Cognition, 2020, 84, 102987. DOI: 10.1016/j.concog.2020.102987

The effect of women's leg posture on gazing behavior and perceived attractiveness. Pazhoohi, F., Grammer, K., Macedo, A.F. et al. Curr Psychol 39, 1049–1054 (2020). https://doi.org/10.1007/s12144-018-9821-y

The Impact of Overnight Orthokeratology on Accommodative Response in Myopic Subjects. Pereira-da-Mota AF, Costa J, Amorim-de-Sousa A, González-Méijome JM, Queirós A. J Clin Med. 2020 Nov 17;9(11):3687. doi: 10.3390/jcm9113687.

Vault changes after cyclopentolate instillation in eyes with posterior chamber phakic intraocular lens. Gargallo-Martinez B, Garcia-Medina JJ, Rubio-Velazquez E, Fernandes P, Villa- Collar C, Gonzalez-Meijome JM, Gutierrez-Ortega R. Sci Rep. 2020 Jun 15;10(1):9646. doi: 10.1038/s41598-020-66146-y. PMID: 32541775; PMCID: PMC7296012.

Visual Performance and High-Order Aberrations with Different Contact Lens Prototypes with Potential for Myopia Control. Martins C, Amorim-De-Sousa A, Faria-Ribeiro M, Pauné J, González-Méijome JM, Queirós A. Curr Eye Res. 2020 Jan;45(1):24-30. doi: 10.1080/02713683.2019.1645182.

Visual Status in a Portuguese Population with Intellectual Disability. Serra P, Costa R, Almeida N, Baptista A. International journal of environmental research and public health. 2020;17. doi: 10.3390/ijerph17217715

Other Articles

Crystalline lens imaging during accommodation with a slit-scanning tomography system: preliminary results. Jessica Gomes and Sandra Franco. EPJ Web Conf., 238 (2020) 12015 . DOI: https://doi.org/10.1051/epjconf/202023812015

6.1.4.2 Books and book chapters

Chapters

Lecionação em Optometria e Ciências da Visão durante e depois da crise da COVID-19. Paulo R. B. Fernandes, Rute J. Macedo de Araújo, Madalena Lira, António Queirós e José M. González-Méijome. 2020. Capítulo (Pag.225). IN: A UNIVERSIDADEDO MINHO EM TEMPOS DE PANDEMIA, II-(Re)Ações. ISBN digital 978-989-8974-28-0. UMinho Editora.https://ebooks.uminho.pt/index.php/uminho/catalog/book/19. https://doi.org/10.21814/uminho.ed.24.10.

An Eye Tracking Study of the Effect of Sensory and Price In-Store Displays. Rodrigues, C., Brandão, A. M., Macedo, A. F., & Baskaran, K. (2020).In Soares, A. M., & Elmashhara, M. G. (Ed.), Emotional, Sensory, and Social Dimensions of Consumer Buying Behavior (pp. 23-49). IGI Global. http://doi:10.4018/978-1-7998-2220-2.ch002

COVID-19 e a visão. José M. González-Méijome, Rute J. Macedo de Araújo, David P. Piñero, Gonzalo Carracedo e Maria J. González-García: Em: A Universidade do Minho em tempos de pandemia. UMinho Editora. Braga, 2020. https://doi.org/10.21814/uminho.ed.24.17

Biopolímeros de lentes de contacto y confort. Capítulo 12. Em: Lentes de contacto y superficie ocular: biomateriales. (pp:203-218). Ed. Ulleye, Xátiva 2020. ISBN: 978-84-122272-1-5.

Control de la miopía con lentes de contacto. Capítulo 20. Em: Lentes de contacto y superficie ocular: biomateriales. (pp:359-379). Ed. Ulleye, Xátiva 2020. ISBN: 978-84-122272-1-5.

6.1.4.3 Conference Proceedings with Pier Review appearing in the ISI Database

PIH18 ANTI-VEGF Treatment Patterns in Neovascular Age-Related Macular Degeneration Patients in Portugal: A National and Regional LEVEL Analysis."Afonso-Silva, M., J. V. Rocha, A. Marques, A. F. Macedo, P. A. Laires, A. S. Almeida, J. Fernandes and R. Santana (2020). Value in Health 23: S542.

PIH12 Neovascular Age-Related Macular Degeneration Patients Treated with ANTI-VEGF Intravitreal Injections in Portugal: An Administrative Database Study from 2013 to 2018." Afonso-Silva, M., J. V. Rocha, A. Marques, A. F. Macedo, P. A. Laires, A. S. Almeida, J. Fernandes and R. Santana (2020). Value in Health 23: S541.

PIH16 ANTI-VEGF Intravitreal Injection Rates in Portugal: An Analysis of the Explanatory Factors Correlated with Geographic Variations."Rocha, J. V., M. Afonso-Silva, A. Marques, A. F. Macedo, P. A. Laires, A. S. Almeida, J. Fernandes and R. Santana (2020). Value in Health 23: S541.

Measurement properties of the Satisfaction With Life Scale in cardiac arrest survivors. Kristofer Arestedt; Johan Israelsson; Ina Marteinsdottir; Antonio Macedo; Evalill Nilsson; Mikael Rask; Jalal Safipour; Hanna Hanna Tuvesson; Amanda Hellstrom (2020). "27th Annual Conference of the International Society for Quality of Life Research. Quality of Life Research 29(1): 1-196. https://doi.org/10.1007/s11136-020-02626-y

Predicting EQ-5D-3L health dimensions in people with impaired vision. Antonio Filipe Macedo; Kristofer Arestedt; Robert Massof; Ina Marteinsdottir; Evalill Nilsson; Mikael Rask; Jalal Safipour; Hanna Tuvesson; Pedro Lima Ramos; Amanda Hellstrom, submitted on behalf of the Portuguese visual impairment study group (PORVIS-group) (2020). 27th Annual

Conference of the International Society for Quality of Life Research." Quality of Life Research 29(1): 1-196. https://doi.org/10.1007/s11136-020-02626-y

6.1.5 Conference Presentations

6.1.5.1 Invited talks delivered at Conferences (International/National)

International

Análise ao Programa Português para Prevenção da Retinopatia Diabética (Diagnóstico Sistemático e Tratamento da Retinopatia Diabética).Associação entre Medidas de Visão Clínica e de Perceção Visual e o Desempenho em Campo de Árbitros de Futebol de Onze. 1° Encontro Internacional da visão e desporto / XXIII Congresso de Optometria. União Profissional de Óticos Optometristas Portugueses, 2020 (Cidade do Futebol - Paço de Arcos, Portugal). António Baptista

Ensino Universitário da Optometria Baseado na Evidência. Faculdade de Saúde de Paulista. Brasil. February, 2, 2020. José M. González-Méijome.

Ciencia y Pseudociencia en Control de Miopia. Congreso de la Asociación Latinoamericana de Ortoqueratología y Control de Miopía. (On-line), 21 November, 2020. José M. González-Méijome.

Mesa Redonda Digitalización de la Profesión y Formación Continua. Jornada sobre el futuro profesional del Óptico-Optometrista. (On-line). Universidad Politécnica de Cataluña (Terrasa, España). (On-line) 29 Octover, 2020. José M. González-Méijome.

Progresión de la Miopía y su Control: Quién, Qué, Cuándo, Cómo,Por qué? Webinar ciclo de conferencias Conoptica. 21st April, 2020. (On-line) José M. González-Méijome.

Progresión de la Miopía y su Control: Quién, Qué, Cuándo, Cómo, Por qué? Universidad de Santo Tomás de Aquino (Bucaramanga, Colombia). 26th September, 2020. (On-line) José M. González-Méijome.

Webinar Covid-19, o impacto no Mundo. Universidade do Contestado (Brasil). 21st May, 2020. (On-line) José M. González-Méijome.

Lentes de contacto, SARS- CoV-2 (y Covid-19). Universidad Antonio Nariño (Colombia). 9th, May, 2020. (On-line) José M. González-Méijome.

Ensino em Optometria e Ciências da Visão Baseado na Evidência. Paulista, Brasil. 21st February 2020. (On-line) José M. González-Méijome.

Webinar - Clinical & Biologic Interactions Over 1-Year of Scleral Lens Wear. The Summit of Specialty Contacts (SSC) 18th February 2020 (on-line). Rute J. Macedo de Araújo

Webinar – State of the art of scleral lens fitting. European Contact Lens and Ocular Surface Congress (ECLSO). 19th September 2020 (online). Rute J. Macedo de Araújo

National

Mitos em Contactologia Contrariados pela Evidência Científica. 15ª Jornada de Contactologia CONTACTUM2020. Braga, February 4th, 2020. José M. González-Méijome.

Análise de Publicações Científicas (contexto clínico). Ciclo de conferencias Optovisionarium. (On-line).15th October, 2020. José M. González-Méijome.

6.1.5.2 Contributed talks delivered at Conferences (International/National)

International

Crystalline lens imaging during accommodation with a slit-scanning tomography system: preliminary results. Jessica Gomes and Sandra Franco. EOS Annual Meeting (EOSAM 2020), Porto 2020

Parameters predictors of the iridocorneal angle after implantable collamer lens surgery. 38th Congress of the European Society of Cataract and Refractive Surgeons, 2020. António Baptista

The influence of age, sex and visual dysfunction on reading ability in school-children. EOS Annual Meeting (EOSAM) 2020. António Baptista.

Pattern electroretinogram amplitudes change in myopic eyes after stimulating optic nerve head with light. Schilling, Tim ; Fernandes, Paulo ; Amorim-de-Sousa, Ana ; Seshadri, Yeshwanth ; González-Méijome, José M. ; Bahmani, Hamed.(#3366207) ORAL FREE PAPER at 2020 ARVO Annual Meeting, 7-13 May 2020. Baltimore USA

6.1.6 National/International Patents

6.1.7 SPIN-OFFS, START-UPS

6.1.8 Supervision of Research Students

6.1.8.1 PhD projects completed in 2020

Author	Supervisor	Title	Host institution/Program	Reference	Starting Date

6.1.8.2 PhD projects in progress in 2020

Author	Supervisor	Title	Host institution/Program	Reference	Starting Date
Alshaarawi M. A. Salem	Sandra Franco, António Baptista	The Effect of Near Vision Tasks in The Visual System: University Students	PhD in Optometry and Vision Science, UMinho	OWN	01/12/2018
Ana Isabel Carvalho Amorim de Sousa	José M. González Méijome, António Queirós	SELECTIVE OPTOELECTRO-PHYSIOLOGICAL STIMULATION OF THE HUMAN RETINA WITH A	PhD in Optometry and Vision Science, UMinho	SFRH/BD/136684/2018	01/10/2018

		NOVEL MICROSTIMULATION PARADIGM			
Andreia Esteves Gomes	Sérgio Nascimento, João linhares	"Tuning illumination and colored optical filters for optimal viewing of human skin",	PhD in Optometry and Vision Science, UMinho	SFRH/BD/147336/2019	01/05/2020
Clara Maria dos Santos Pereira.	Maria Madalena Cunha Faria Lira Paula Sampaio	Uma nova visão para as lentes de contacto	PhD In Sciences (Biology)	OWN	01/05/2018
Eduardo Ínsua Pereira	Madalena Lira e Paula Sampaio	Evaluation of cytotoxic potential and inflammatory response induced by contact lenses	PhD in Optometry and Vision Science, UMinho	OWN	01/10/2019
Eduardo Teixeira	Francisco Ferreira (UBI), António Baptista	Os principais problemas de visão na Europa: a perspetiva Portuguesa	PhD Biomedicine (UBI)	OWN	07/07/2018
Jessica Gomes	Sandra Franco	Real-time measurement of the ocular and internal wavefront aberrations of the eye during accommodation	PhD in Optometry and Vision Science, UMinho	UMINHO/BI/420/2018	01/09/2018
Laura Moreno	Antonio Filipe Macedo	Cost-utility of a visual rehabilitation program	PhD in Optometry and Vision Science, UMinho	OWN	31/03/2015
Lina María Rodríguez Cely	José M. González Méijome, António Queirós	CORNEAL AND REFRACTIVE PARAMETERS WITH IMPACT IN CONTACT LENS FITTING IN COLOMBIA AND PORTUGAL	PhD in Optometry and Vision Science, UMinho	OWN	
Pedro Lima Ramos	Antonio Filipe Macedo	Studying prevalence using capture-recapture methods: visual impairment in Portugal	Double Degree - Linnaeus University and Univeristy of Minho PhD in Biomedical Sciences /PhD Mathematics	SFRH/BD/119420/2016	01/06/2017
Pedro Tiago Maia dos Reis de Jesus	Jorge Jorge	O Efeito da compensação das disfunções acomodativa/vergenciais na progressão da miopia	PhD in Optometry and Vision Science, UMinho	OWN	27/05/2020
Pelsin Demir	Antonio Filipe Macedo	Myopia prevalence and risk factors for myopia progression	PhD in Optometry and Vision Science, UMinho	Industrial PhD	01/02/2018
Salomé Pereira	Paulo Fernandes	Objective Eye Care Measurements Obtainment with Eyetracker and their Influence on Ophthalmic Lens Adaptation	PhD in Optometry and Vision Science, UMinho		
Vera Lucia Alves Carneiro	José M. González Méijome	Advocacy for Promotion and Integration of Refractive Error Services	PhD in Optometry and Vision Science, UMinho		

		into National Health Services			

6.1.8.3 MSc projects completed in 2020

Author	Supervisor	Title	Host institution/Program
Andreia Raquel Carneiro Pinho	Jorge Jorge e Madalena Lira	Estudo dos erros refrativos na prevalência da ambliopia em crianças em idade pré-escolar	ECUM
Joana Manuela de Sousa Fernandes	Madalena Lira e Sandra Franco	Alterações na película lacrimal com o uso de ecrãs	ECUM
Daniela Pinto Chaves	Sandra Franco, João Linhares	Influência da iluminação colorida nos parâmetros acomodativos em sujeitos com disfunções acomodativas	ECUM
Tiago Miguel Silva Machado	Sandra Franco, João Linhares	A influência da iluminação colorida na visão binocular	ECUM
Cláudia Borges	António Baptista	Influência da insuficiência da acomodação na leitura	ECUM
Ana Luísa Moreira Marques	José M. González-Méijome e Rute J. Macedo de Araújo	Optical and Visual Performance of Two Scleral Lenses	ECUM

6.2. Physics of quantum materials and bionanostructures

6.2.1. Researchers

Principal investigator	Paulo José Gomes Coutinho
Members	**Effective members** Ana Rita Oliveira Rodrigues Anabela Gomes Rolo Bernardo Gonçalves Almeida Bruno António Campos Amorim Diogo Alberto Rocha Lopes Eduardo Jorge Nunes Pereira Elisabete Maria dos Santos Castanheira Coutinho Etelvina de Matos Gomes Gaspar José Brandão Queirós Azevedo Machado Gueorgui Vitalievitch Smirnov Irene Estevez Caride Pedro Santos Hall Agorreta Alpuim Joel Nuno Pinto Borges Jorge Manuel da Silva Figueiredo José Carlos Viana Gomes 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 Peter Michael Schellenberg Ricardo Pedro Lopes Martins de Mendes Ribeiro Rosa Maria Ferreira Batista Rui Miguel Soares Pereira Sofia Oliveira Lopes Stephane Louis Clain Tatiana Gabriela Rappoport (until septembre 2020) **Collaborators with PhD – staff members** Jorge António Silva Mendes José Luis Pires Ribeiro Júlia Maria Simões Dias Barata de Tovar Ayres de Campos Maria José Fontes Alexandre Forjaz de Sampaio Teresa Maria Santos Ribeiro Viseu

	Other collaborators with PhD Ana Pedro Lemos Paião Filipe André Peixoto Oliveira Jaime Eduardo Vieira Silva Moutinho Santos Yuliy Bludov **PhD students (supervised or co-supervised by CFUM researchers)** Balaji Sompalle Beatriz Dias Cardoso Bruna Machado da Silva Bruno Rodrigues Pacheco e Murta Carlos Fernandes Celso Joel Oliveira Ferreira Cláudia Vanessa Dias Reis Danilo Pedrelli Diana Isabel Faria Meira Eduarda Barbosa Fernandes Gonçalo Filipe Santos Catarina Irina Soraia Rainho Rio João Miguel Peixoto Oliveira João Pedro dos Santos Pires José Diogo Guimarães Marta Sofia Vilela Barreira Teixeira Maurício Quintela Patrícia Alexandra Pereira da Silva Patrícia Daniela Cabral da Silva Sérgio Rafael da Silva Veloso Telma Bezerra Soares Telma Campos Domingues Tiago Alves Queirós Vítor Filipe Henriques da Silva Viviana Lima de Sousa

6.2.1. Brief description of the scientific work carried out within the Research Line in 2020

The research focused on three topics: plasmonics properties of graphene in van der Waals heterostructures and metals, excitons in 2D semiconductors, magnetic properties of magnetic 2D materials. Theoretical studies were also focused on the electronic properties of twisted bilayer graphene, disordered 3D Dirac semimetals, polaritons and excitons in 2D materials and mesoscopic transport.

Modelling of the optical properties of 2D materials (graphene and transition metal dichalcogenides), focused on polaritons in a microcavity and topological aspects of Tamm polaritons in photonic structures with 2D materials, was performed. Quantum simulations of model systems (non-radiative energy transport, Stark effect) on a quantum computer were carried out, as well as the modelling of polarized light scattering by rough surfaces in the context of objects' discrimination using LiDAR-type sensors.

An open source software called 'berry' was developed, aiming at calculating many electronic, optical and magnetic properties, departing from the Bloch functions obtained in a standard DFT calculation. The software can be downloaded from the github and is in an early moment of development (version 0.1) but is able already to calculate important properties in non-magnetic, 2D materials. It can untangle the band structure of the material so that gradients in k of the wavefunctions and energy eigenvalues can be calculated, as well as the Berry connections. The linear optical conductivity and the second order optical conductivity for second harmonic generation (SHG) of two 2D materials, hBN and InSe, were determined. The basis for the calculation of many electronic, optical and magnetic properties was created, to be further developed in the following years.
The EM shielding by polymer composites containing carbon fibers, metallic fibers or graphene was investigated. The optical properties of chiral magnetic materials and the adsorption of ion electrolytes by graphene electrodes were studied.
Aptamers were successfully used as probes for the molecular biorecognition of proteins on graphene surfaces. A general clean-room lithographical process for the fabrication of graphene biosensors was developed. A touch screen display using graphene inks developed by the group was fabricated.
The development of multifunctional nanosystems carrying multiple strategies for improved therapeutic performance was continued. Novel amphiphilic chitosan micelles as carriers for hydrophobic anticancer drugs were produced, as well as serine-derived gemini surfactants and monoolein vectors. High-throughput screening green methods that save reagents, money and do not require animal experimentation, were pursued and applied for biophysical profiling of newly synthesized drugs, bioactives and nanotherapeutics.
Magnetoliposomes based on ferrite nanoparticles (mixed calcium/magnesium ferrites and manganese ferrite) and magnetic/plasmonic nanoparticles were developed. Novel magnetogels containing lipid-covered and citrate-coated nanoparticles were obtained. Magnetic nanosystems for environmental applications were improved. Optimized lipidic nanosystems and chitosan nanocapsules were used as nanocarriers for plant extracts focusing applications as biopesticides.
The investigation on self-assembled dipeptide diphenylalanine derivatives has been continued, new dipeptides have been synthesized and their linear optical absorption and photoluminescence properties were studied. The piezoelectric and nonlinear optical properties of these systems when embedded into polymer nanofibers have also been studied.
Novel nanostructured multiferroic materials, consisting of CaMnO3, Ca3Mn2O7 and Can+1MnnO3n+1 laser ablated thin films were synthesized and their structural and magnetic properties were characterized. Nanoparticles of R5(SixGe1-x)4 were produced by laser ablation and the optimization of the preparation conditions was studied, taking into account their structural and magnetocaloric properties. The electrical properties of rare earth nickelite films were characterized, particularly in the region of their metal-insulator transition. The simulation of the temperature profile in the laser ablation process was developed, in order to characterize and control the annealing parameters during laser annealing.
Nanoplasmonic thin film materials composed by noble metal nanoparticles (Au, Ag) dispersed in dielectric/semiconductor matrixes (TiO2, CuO, Al2O3, ZnO, AlN etc.) were prepared, for application in optical gas sensors and biosensors. A high-resolution localized surface plasmon resonance (LSPR) spectroscopy, including a software, was developed for sensing tests.
TiO2 nanotubes and graphitic carbon nitride (g-C3N4) nanosheets were produced and coupled with silver and/or copper for photoproduction of hydrogen by visible light, with simultaneous photodegradation of pollutants. Mesoscopic TiO2 thin films by dip coating were prepared for use in photovoltaic Grätzel cells sensitized by quantum dots (PbS) that are in situ obtained by the SILAR technique.

6.2.2. Future research summary

The research for 2021 wil be the continuation of that on 2020, with focus on coupling of graphene plasmons to superconductors, generation of high harmonics based on the stark effect in 2D semiconductors, and magnon-plasmons coupling in 2D magnetic materials. The electronic properties of 2D materials, with added emphasis on the excitonic properties of transition metal dichalcogenides, will also be studied.

The theoretical and computational modelling of the optical properties of materials and metamaterials containing graphene and other 2D materials will be carried out.
The modelling of ultrafast and non-linear optical responses of 2D materials (graphene and transition metal dichalcogenides) under pulsed excitation will be performed. Quantum simulations of model systems (non-radiative energy transport in photosynthesic systems) on a quantum computer will be carried out. Application of machine learning algorithms for objects' discrimination using polarized light scattering will be done.
The software 'berry' will be further developed, to extend it to the calculations on magnetic and 3D materials. The performance of the software will be improved and more properties will be added to the possibilities of calculation.
In the field of magnetic bionanosystems, magnetoliposomes and magnetolipogels will be continuously optimized for application in multimodal cancer therapy. An optimized nanoformulation for plant extracts to be used as green pesticides will be developed.
The development of health advanced solutions, interconnected with nanotechnologies and biomaterials covering strategic topics in response to challenges of aging (neurodegenerative and eyesight diseases) and cancer will be pursued. A microfluidic based skin-biomimicry platform to screen compounds for topical cutaneous application will continue to be developed.
The dielectric and piezoelectric properties of nanofibers fabricated by the electrospinning technique and doped with semi-organic ferroelectrics will be studied. The synthesis of several new dipeptides and study of their linear and nonlinear optical properties (in their crystalline state and solution) will be continued, with fabrication of nanofiber arrays and evaluation of their dielectric, piezoelectric and nonlinear optical properties.
New micro- and nanostructured materials (films, nanofibers, nanoparticles) with magnetic, ferroelectric and multiferroic properties for biological, sensor and spintronic applications will be developed and their structural, magnetic, optical and dielectric properties will be investigated.
The covalent functionalization of graphene surfaces for biosensing devices will be performed. The design and fabrication of graphene field-effect transistors functionalized with aptamers for dopamine neurotransmitter sensing will be continued. The fabrication of graphene plasmonic devices operating in the terahertz for molecular detection will be carried out, as well as graphene radio-frequency transistors and passive components.
LSPR sensors will be optimized to detect chemical, physical or mechanical stimuli, allowing a wide range of fundamental information of on-going processes. Besides LSPR -gas and -biosensors, there will be a continuous effort on the research in LSPR thin films using other transduction mechanisms.
The development of graphitic carbon nitride (g-C3N4) nanosheets coupled with plasmonic nanostructures will be optimized in order to improve the efficiency of photoproduction of hydrogen with simultaneous photodegradation of pollutants using visible light.

6.2.3. Publications

6.2.3.1. Regular articles published in ISI/Scopus Journals

A colloquium on the variational method applied to excitons in 2D materials, M. F. C. Martins Quintela, N. M. R. Peres, European Physical Journal B 93, 222 (2020).

Analytical Quantitative Semi-Classical Approach to the LoSurdo-Stark Effect and Ionization in 2D excitons. J. C. G. Henriques, H. C. Kamban, T. G. Pedersen, N. M. R. Peres, Physical Review B 102, 035402 (2020).

Anisotropic PCL nanofibers embedded with nonlinear nanocrystals as strong generators of polarized second harmonic light and piezoelectric currents, C. R. Bernardo, R.M.F. Baptista, E. Matos Gomes, P. E. Lopes, M. M. M. Raposo, S.P.G. Costa, M.S. Belsley, Nanoscale Advances 2, 1206-1213 (2020)

Anisotropic Stark shift, field-induced dissociation, and electroabsorption of excitons in phosphorene. H. C. Kamban, T. G. Pedersen, N. M. R. Peres, Physical Review B 102, 115305 (2020).

Application of natural pigments in ordinary cooked ham. S. Dias, E. M. S. Castanheira, A. G. Fortes, D. M. Pereira, A. R. O. Rodrigues, R. Pereira, M. S. T. Gonçalves, Molecules 25, 2241 (2020).

Binuclear furanyl-azine metal complexes encapsulated in NaY zeolite as efficiently heterogeneous catalysts for phenol hydroxylation, I. Kuźniarska-Biernacka, M. M. M. Raposo, R. M. F. Batista, O. S. G. P. Soares, M. F. R. Pereira; P. Parpot, C. Oliveira, E. Skiba, E. Jartych, A. M. Fonseca, I. C. Neves, Journal of Molecular Structure 1206, 127687 (2020).

Clean-Room Lithographical Processes for the Fabrication of Graphene Biosensors. P. D. Cabral, T. Domingues, G. Machado Jr., A. Chicharo, M. F. Cerqueira, E. Fernandes, E. Athayde, P. Alpuim, J. Borme. Materials 13, 5728 (2020).

Cytotoxic plant extracts towards insect cells: bioactivity and nanoencapsulation studies for application as biopesticides. A. I. F. Lopes, M. Monteiro, A. R. L. Araújo, A. R. O. Rodrigues, E. M. S. Castanheira, D. M. Pereira, P. Olim, A. G. Fortes, M. S. T. Gonçalves, Molecules 25, 5855 (2020).

Dehydropeptide-based plasmonic magnetogels: a supramolecular composite nanosystem for multimodal cancer therapy. S. R. S. Veloso, J. A. Martins, L. Hilliou, C. O. Amorim, V. S. Amaral, B. G. Almeida, P.J. Jervis, R. M. Moreira, D. M. Pereira, P. J. G. Coutinho, P. M. T. Ferreira, E. M. S. Castanheira, Journal of Materials Chemistry B 8, 45-64 (2020).

Development of Novel Magnetoliposomes containing Nickel Ferrite Nanoparticles covered with Gold for Applications in Thermotherapy. I. S. R. Rio, A. R. O. Rodrigues, C. P. Rodrigues, B. G. Almeida, A. Pires, A. M. Pereira, J. P. Araújo, E. M. S. Castanheira, P. J. G. Coutinho, Materials 13, 815 (2020).

Dry electrodes for surface electromyography based on architectured titanium thin films. M.S. Rodrigues, P. Fiedler, N. Küchler, R.P. Domingues, C. Lopes, J. Borges, J. Haueisen, F. Vaz, Materials 13, 2135 (2020).

Electrosprayed whey protein-based nanocapsules for β-carotene encapsulation. R. Rodrigues, P. E. Ramos, M. F. Cerqueira, J. A. Teixeira, A. A. Vicente, L. M. Pastrana, R. Pereira, M. A. Cerqueira, Food Chemistry 314, 126157 (2020).

Enhancing the Sensitivity of Nanoplasmonic Thin Films for Ethanol Vapor Detection. M.S. Rodrigues, J. Borges, F. Vaz, Materials, 13 (2020) 870.

Evolution of the mechanical properties of Ti-based intermetallic thin films doped with different metals to be used as biomedical devices. C. Lopes, C. Gabor, D. Cristea, R. Costa, R.P. Domingues, M.S. Rodrigues, J. Borges, E. Alves, N.P. Barradas, D. Munteanu, F. Vaz, Applied Surface Science 505, 144617 (2020).

Excitation of localized graphene plasmons by a metallic slit. Y.V. Bludov, N. M. R. Peres, M. I. Vasilevskiy, Physical Review B 101, 075415 (2020).

Excitonic Magneto-Optical Kerr Effect in 2D Transition Metal Dichalcogenides induced by Spin Proximity. J. C. G. Henriques, G. Catarina, A. T. Costa, J. Fernández-Rossier, N. M. R. Peres, Physical Review B 101, 045408 (2020).

Exciton-polaritons of a 2D semiconductor layer in a cylindrical microcavity. J. N. S. Gomes, C. Trallero-Giner, N. M. R. Peres, M. I. Vasilevskiy, Journal of Applied Physics 127, 133101 (2020).

Excitons in Phosphorene: A Semi-Analytical Perturbative Approach. J. C. G. Henriques, N. M. R. Peres, Physical Review B 101, 035406 (2020).

Far-field Excitation of Single Graphene Plasmon Cavities with Ultra-compressed Mode-volumes. I. Epstein, D. Alcaraz, Z. Huang, V.-V. Pusapati, J.-P. Hugonin, A. Kumar, X. Deputy, T. Khodkov, T.G. Rappoport, N. M. R. Peres, D. R. Smith, F.H.L. Koppens, Science 368, 1219 (2020).

Field-effect transistors made of graphene grown on recycled copper foils. G. Machado Jr, M.F. Cerqueira, J. Borme, M. Martins, J. Gaspar, P. Alpuim, Materials Chemistry and Physics 256, 123665 (2020).

Fresnel polarisation of infrared radiation by elemental Bismuth. B. S. C. Alexandre, L.C. Martins, J. E. Santos, A. J. Pontes, N. M. R. Peres, European Physical Journal B 93, 119 (2020).

Highly Confined In-plane Propagating Exciton-Polaritons on Monolayer Semiconductors. I. Epstein, A. J. Chaves, D. A. Rhodes, B. Frank, K. Watanabe, T. Taniguchi, H. Giessen, J.C. Hone, N. M. R. Peres, F. H. L. Koppens, 2D Materials 7, 035031 (2020).

Landauer transport as a quasisteady state on finite chains under unitary quantum dynamics, J. P. Santos Pires, B. Amorim, J. M. Viana Parente Lopes. Phys. Rev. B 101, 104203 (2020)

Laser printing of micro-electronic communication systems for smart implants applications. C. G. Moura, O. Carvalho, V. H. Magalhães, R.S.F.Pereira, M. F. Cerqueira, L.M.V. Gonçalves, R. M. Nascimento, F. S. Silva. Optics and Laser Technology 128, 106211 (2020).

Laser printing of silver-based micro-wires in ZrO2 substrate for smart implant applications. C. G. Moura, D. Faria, O. Carvalho, R. Pereira, M.F. Cerqueira, R.M. Nascimento, F. Silva, Optics and Laser Technology 131, 106416 (2020).

Magnetoliposomes incorporated in peptide-based hydrogels: towards development of magnetolipogels. S. R. S. Veloso, R. G. D. Andrade, B. C. Ribeiro, A. V. F. Fernandes, A. R. O. Rodrigues, J. Martins, P. M. T. Ferreira, P. J. G. Coutinho, E. M. S. Castanheira, Nanomaterials 10, 1702 (2020).

Magneto-optical Kerr effect in spin split two-dimensional massive Dirac materials. G. Catarina, N. M. R. Peres, J. Fernández-Rossier, 2D Materials 7, 025011 (2020).

Measuring Valley Polarization in Two-Dimensional Materials with Second-Harmonic Spectroscopy Ho, Yi Wei ; Rosa, Henrique G. ; Verzhbitskiy, Ivan ; Rodrigues, Manuel J. L. F. ; Taniguchi, Takashi ; Watanabe, Kenji ; Eda, Goki ; Pereira, Vitor M. ; Viana-Gomes, Jose C. ACS PHOTONICS Volume 7 Edição 4 Página 925-931 Publicado 2020

Mapping a quantum walk by tuning the coupling coeficiente Ng, Kian Fong ; Rodrigues, Manuel J. L. F. ; Viana-Gomes, Jose ; Ling, Alexander ; Grieve, James A. OPTICS LETTERS Volume 45 Edição 2 Página 288-291 Publicado 2020

Multilayer passive radiative selective cooling coating based on Al/SiO2/SiNx/SiO2/TiO2/SiO2 prepared by dc magnetron sputtering. N. F. Cunha, A. AL-Rjoub, L. Rebouta, L. G. Vieira, S. Lanceros-Mendez. Thin Solid Films 694, 137736 (2020).

Nanocomposite Au-ZnO thin films: Influence of gold concentration and thermal annealing on the microstructure and plasmonic response. P. Pereira-Silva, J. Borges, M.S. Rodrigues, J.C. Oliveira, E. Alves, N.P. Barradas, J.P. Dias, A. Cavaleiro, F. Vaz, Surface and Coatings Technology 385, 125379 (2020).

NANOPTICS: In-depth analysis of NANomaterials for OPTICal localized surface plasmon resonance Sensing. M.S. Rodrigues, R.M.S. Pereira, M.I. Vasilevskiy, J. Borges, F. Vaz, SoftwareX 12, 10522 (2020).

Natural Pigments of Anthocyanin and Betalain for Coloring Soy-Based Yogurt Alternative. S. Dias, E. M. S. Castanheira, A. G. Fortes, D. M. Pereira, M. S. T. Gonçalves, Foods 9, 771 (2020).

Near-unity light absorption in a monolayer WS2 van der Waals heterostructure cavity. I. Epstein, B. Terrés, A.J. Chaves, V.-V. Pusapati, D. A. Rhodes, B. Frank, V. Zimmermann, Y. Qin, K. Watanabe, T. Taniguchi, H. Giessen, S. Tongay, J.C. Hone, N.M.R. Peres, F. Koppens, Nano Letters 20, 3545 (2020).

New eugenol derivatives with enhanced insecticidal activity. M. J. G. Fernandes, D. M. Pereira, R. B. Pereira, A. G. Fortes, E.M.S. Castanheira, M.S.T. Gonçalves, International Journal of Molecular Sciences 21, 9257 (2020).

New NIR dyes based on quinolizino[1,9-hi]phenoxazin-6-iminium chlorides: synthesis, photophysics and antifungal activity. B. R. Raju, M. I. P. S. Leitão, M. J. Sousa, P. J. G. Coutinho, M. S. T. Gonçalves, Dyes and Pigments 173, 107870 (2020).

Non-invasive molecular assessment of human embryo development and implantation potential, C. M. Abreu, V. Thomas, P. Knaggs, A. Bunkheila, A. Cruz, S. R. Teixeira, P. Alpuim, L. W. Francis, A. Gebril, A. Ibrahim, L. Margarit, D. Gonzalez, P. P. Freitas, R. S. Conlan, I. M. Pinto. Biosensors & Bioelectronics 157, 112144 (2020).

Non-reciprocal magnons in a two dimensional crystal with off-plane magnetization. M. J. T. Costa, J. Fernández-Rossier, N. M. R. Peres, A. T. Costa, Physical Review B 102, 014450 (2020).

Novel amphiphilic chitosan micelles as carriers for hydrophobic anticancer drugs. A. Almeida, M. Araújo, R. Novoa-Carballal, F. Andrade, H. Gonçalves, R.L. Reis, M. Lúcio, S. Schwartz, B. Sarmento. Materials Science and Engineering C 112, 110920 (2020)

On the solution of the slope beach problem in the context of shallow-water code benchmarking: Why non-linearization of the initial waveforms is essential. J. Figueiredo, S. Clain. Advances in Water Resources 145, 103751 (2020).

Optical Absorption of single-layer hexagonal boron nitride in the ultraviolet. J. C. G. Henriques, G. B. Ventura, C. D. M. Fernandes, N. M. R. Peres, Journal of Physics: Condensed Matter 32, 025304 (2020).

Optimal Control with Sweeping Processes: Numerical Method, M. d. R. de Pinho, M. M. A. Ferreira, Georgi V. Smirnov, Journal of Optimization Theory and Applications185, 845-858 (2020).

Optimization of Au:CuO Nanocomposite Thin Films for Gas Sensing with High-Resolution Localized Surface Plasmon Resonance Spectroscopy. M. Proença, M. S. Rodrigues, J. Borges, F. Vaz, Analytical Chemistry 92, 4349-4356 (2020).

Physicochemical characterisation and release behaviour of curcumin-loaded lactoferrin nanohydrogels into food simulants. J. F. Araújo, A. I. Bourbon, L. S. Simões, A. A. Vicente, P. J. G. Coutinho, O. L. Ramos, Food & Function 11, 305-317 (2020).

Prediction of paclitaxel pharmacokinetic based on in vitro studies: Interaction with membrane models and human serum albumin. A. M. Carvalho, E. Fernandes, H. Gonçalves, J.J. Giner-Casares, S. Bernstorff, J. B. Nieder, M.E.C.D. Real Oliveira, M. Lúcio, International Journal of Pharmaceutics 580, 119222 (2020) (with INL and Elettra Sincontrone Trieste).

Preparation of Plasmonic Au-TiO2 Thin Films on a Transparent Polymer Substrate. M.S. Rodrigues, D.I. Meira, C. Lopes, J. Borges, F. Vaz, Coatings 10, 227 (2020).

Quantization of graphene plasmons. B. A. Ferreira, B. Amorim, A. J. Chaves, N. M. R. Peres, Physical Review A 101, 033817 (2020).

Shape Anisotropic Iron Oxide-Based Magnetic Nanoparticles: Synthesis and Biomedical Applications. R. G. D. Andrade, S. R. S. Veloso, E. M. S. Castanheira, International Journal of Molecular Sciences 21, 2455 (2020).

Simulation of non-radiative energy transfer in photosynthetic systems using a quantum computer, J. D. Guimarães, C. Tavares, L. S. Barbosa, M.I. Vasilevskiy, Complexity (2020) 3510676.

Stealth magnetoliposomes based on calcium-substituted magnesium ferrite nanoparticles for curcumin transport and release. B. D. Cardoso, A.R.O. Rodrigues, B. G. Almeida, C. O. Amorim, V.S. Amaral, E. M. S. Castanheira, P. J. G. Coutinho, International Journal of Molecular Sciences 21, 3641 (2020).

The effect of Bi addition on the electrical and microstructural properties of SAC405 soldered structure. D. Soares, M. Sarmento, D. Barros, H. Peixoto, H. Figueiredo, R. Alves, I. Delgado, J.C. Teixeira, F. Cerqueira, Soldering & Surface Mount Technology 33, 19-25 (2020).

Topological magnons in CrI3 monolayers: an itinerant fermion description. A. T. Costa, D. L. R. Santos, N. M. R. Peres, J. Fernández-Rossier, 2D Materials 7, 045031 (2020).

Topological Photonic Tamm-States and the Su-Schrieffer-Heeger Model. J. C. G. Henriques, T. G. Rappoport, Y. V. Bludov, M. I. Vasilevskiy, N. M. R. Peres, Physical Review A 101, 043811 (2020).

Understanding the electromagnetic response of graphene/metallic nanoctructures hybrids of different dimensionality. T. G. Rappoport, I. Epstein, F.H.L. Koppens, N.M.R. Peres, ACS Photonics 7, 2302 (2020).

Unit cell volume reduction of Gd5(Si,Ge)4 nanoparticles controlled by bulk compressibility, V.M. Andrade, J.H. Belo, N.R. Checca, A. Rossi, F. Garcia, B. Almeida, J.C.G. Tedesco, A. Poulain, A.M. Pereira, M.S. Reis, J.P. Araújo. Journal of Alloys and Compounds, 849, 156384 (2020).

Vapor grown carbon nanofiber based cotton fabrics with negative thermoelectric power. A.J. Paleo, E. M. F. Vieira, K. Wan, O. Bondarchuk, M. F. Cerqueira, E. Bilotti, M. Melle-Franco, A. M. Rocha, Cellulose 27, 9091-9104 (2020).

Very high-order method on immersed curved domains for finite difference schemes with regular Cartesian grids. J. Fernández-Fidalgo, Stéphane Clain, L. Ramírez, I. Colominas, Xesús Nogueira. Computer Methods in Applied Mechanics and Engineering 360, 112782 (2020).

Polarization-coded material classification in automotive LIDAR aiming at safer autonomous driving implementations, E. J. Nunes-Pereira, H. Peixoto, J. Teixeira, and J. Santos, Applied Optics Vol. 59, Issue 8, pp. 2530-2540 (2020).https://doi.org/10.1364/AO.375704

Oblique astigmatism and field curvature measured with light-field imaging, Flávio P. Ferreira, Marco A. Sousa, Moisés A. S. Duarte, Boris P. J. Bret, and Eduardo J. Nunes-Pereira, Applied Optics Vol. 59, Issue 31, pp. 9710-9714 (2020).

Other articles

Berry connections calculated from first principles, I.J.M. Moura, G.B. Ventura, R.M. Ribeiro. arXiv:2006.02744; https://arxiv.org/abs/2006.02744

6.2.3.2. Books and book chapters

Books

Física XXI - Introdução à Física Contemporânea, Ricardo Mendes Ribeiro, Editora Livraria da Física, 1ª Ed. 2020; ISBN: 9786555630107

Proceedings of the Portuguese Condensed Matter Physics National Conference (CMPNC 2019), EPJ Web of Conferences,.G. Almeida and J. Agostinho Moreira (Eds.), Volume 233 (2020).

Edition

Chapters

Yet a Smarter Irrigation System. Sérgio F. Lopes, Rui M. S. Pereira, Sofia O. Lopes, Micael Coutinho, Aureliano Malheiro, Victor Fonte., Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering Book Series LNICST, 323 (2020).

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

Raman spectroscopy for tumor diagnosis in mammary tissue. S. Pimenta, M.J. Maciel, A. Miranda, F. Cerqueira, P. Alpuim, J. H. Correia, PHOTOPTICS 2020 - Proceedings of the 8th International Conference on Photonics, Optics and Laser Technology, 2020, pp. 131–134. ISBN: 978-989-758-401-5; DOI: 10.5220/0009093501310134

Surface-plasmon-polariton-assisted diffraction of THz waves on a graphene-covered slit, Y. Bludov, B. Alexandre, N.M.R. Peres, M.I. Vasilevskiy, IEEE IEEEXplore Digital Library (2020).https://ieeexplore.ieee.org/xpl/conhome/9194588/proceeding

Energy loss by fast-travelling charged particles traversing two-dimensional materials, J. E. Santos, M.I. Vasilevskiy, N. M. R. Peres, A.-P. Jauho, Proc. Portuguese Condensed Matter Physics National Conference (CMPNC 2019), EPJ Web of Conferences 233, 03005 (2020); doi://10.1051/epjconf/202023303005

Simulation of the temperature profile of BaCaZrTiO3 thin films during laser annealing, Tiago Rebelo, João Alves, Bernardo Almeida, Proc. Portuguese Condensed Matter Physics National Conference (CMPNC 2019), EPJ Web of Conferences 233, 05008 (2020); https://doi.org/10.1051/epjconf/202023305008

6.2.4. Conference Presentations

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

International

Polaritonics in 2D Quantum Materials, Nuno Peres, "Quantum Matter: Materials & Concepts" – Summer Training Program 2020, 31 Aug. - 4 Sept. 2020, Caramulo, Portugal.

Graphene Plasmonics, Nuno Peres, NanoPT2020 Online Conference, 23-24 Sept. 2020.

Graphene devices for biosensing applications, P. Alpuim. ImagineNano2020 Online Conference, September 29-October 1, 2020.

High-quality graphene-based dispersions for flexible electronics, P. Alpuim, NanoPT2020 Online Conference, September 23-24, 2020.

Surface-plasmon-polariton-assisted diffraction of THz waves on a graphene-covered slit, Y. Bludov, B. Alexandre, N.M.R. Peres, M. I. Vasilevskiy, 22-nd International Conference on Transparent Optical Networks (ICTON 2020), Bari, Italy, 19-23 July 2020 (online).

Modelling of environment sensors based on the surface plasmon resonance effect, M. I. Vasilevskiy, 2nd International Conference on Mathematical Modeling in Materials Science of Electronic Components, Moscow, Russia, 19-20 October 2020.

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

International

Supramolecular plasmonic magnetic gels for controlled drug delivery, S. R. S. Veloso, P.M. T. Ferreira, E. M. S. Castanheira, NanoBioMed Online Conference (NBMO2020), 10 July 2020, Spain.

Stealth magnetoliposomes based on calcium-substituted magnesium ferrite nanoparticles for curcumin transport and release, B.D. Cardoso, A.R.O. Rodrigues, B. G. Almeida, C.O. Amorim, V.S. Amaral, E. M. S. Castanheira, P. J. G. Coutinho, NanoBioMed Online Conference (NBMO2020), 10 July 2020, Spain.

Synthesis and characterization of magnetoliposomes containing nickel ferrite nanoparticles covered with gold for applications in phototherapy, I. S. R. Rio, A. R. O. Rodrigues, E. M. S. Castanheira, P. J. G. Coutinho, NanoBioMed Online Conference (NBMO2020), 10 July 2020, Spain.

Magnetic/plasmonic liposomes as nanocarriers for novel antitumor tricyclic lactones against non small cell lung cancer, A. R. O. Rodrigues, I. S. R. Rio, J. M. Rodrigues, M.-J. R. P. Queiroz, R. C. Calhelha, I. C. F. R. Ferreira, B. G. Almeida, A. Pires, A. M. Pereira, J. P. Araújo, P. J. G. Coutinho, E.M. S. Castanheira, NanoBioMed Online Conference (NBMO2020), 10 July 2020, Spain.

Development of supramolecular peptide-based magnetolipogels: towards on-demand drug delivery, S. R. S. Veloso, P. M. T. Ferreira, E.M.S. Castanheira, NanoPT2020 Online Conference, 23–24 Sept. 2020, online.

Graphene transistors for biosensing: optimizing the microfabrication process, Patrícia Silva, E. Fernandes, T. Domingues, J. Borme, P. Alpuim, NanoPT2020 Online Conference, 23-24 September 2020, online.

Polymeric micelles obtained by a novel chitosan derivative as potential delivery nanosystem of hydrophobic drugs, Andreia Almeida, Marco Araújo, Ramon Novoa-Carballal, Marlene Lúcio, Bruno Sarmento, XIII Spanish-Portuguese Conference on Controlled Drug Delivery, January 2020, Santiago de Compostela, Spain.

Bio-inspired models and biophysical studies applied in ADMET profiling, Marlene Lúcio, Eduarda Fernandes, M. Elisabete C.D. Real Oliveira, NanoBioMed Online Conference (NBMO2020), 10 July 2020, Spain.

Lipid Biomimetic Models as an Alternative Platform to Guide the Drug Design Process, Eduarda Fernandes, M. Elisabete C.D. Real Oliveira, Marlene Lúcio, NanoBioMed Online Conference (NBMO2020), 10 July 2020, Spain.

Portable graphene transistor sensing system for wine DNA detection, Agnes Purwidyantri, Telma Domingues, Andrey Ipatov, Catarina Abreu, Marco Martins, Jérôme Borme, Pedro Alpuim, Marta Prado, NanoPT2020 Online Conference, 23-24 September 2020.

Upscaling MoSe2 and hBN via controlled chemical vapor deposition, J. Rodrigues, J. Grzonka, J. Santos, P. Ferreira, P. Alpuim, A. Capasso, NanoPT2020 Online Conference, 23-24 Septembe, 2020.

Nanocomposite Thin Films for Gas Sensing with High-Resolution Localized Surface Plasmon Resonance Spectroscopy, Joel Borges, 18th International Conference on Thin Films & 18th Joint Vacuum Conference (ICTF-JVC 2020) (Full Online Conference), 23-26 November 2020.

Differential Phase Contrast: a Tool to observe Manganese Migration in Li1-xMn2O4, S. Calderon V., R. M. Ribeiro, P.J.Ferreira, Virtual Early Career European Microscopy Congress 2020, 24-26 November 2020, Online.

Synthesis of Can+1MnnO3n+1 thin films by Pulsed-Laser Deposition, B. Silva, B. Almeida, The Joint European Magnetic Symposia 2020 – JEMS2020, Lisbon, 7-11 December 2020.

Optimization of the production of R5(SixGe1-x)4 nanoparticles through Nanosecond and Femtosecond Pulsed Laser Ablation in Liquids, João Costa, João Horta Belo, João Araújo, Vivian Andrade, Hélder Crespo, Miguel Canhota, Bernardo Almeida, Bruna M. Silva, João Oliveira, The Joint European Magnetic Symposia 2020 – JEMS2020, Lisbon, 7-11 December 2020.

Deposition conditions of Ca3Mn2O7 thin films by Pulsed-Laser Deposition, B. M. Silva, B.G. Almeida, Nanotech France, Paris, 24-26 June 2020

National

CaMnO3 films by Pulsed-Laser Deposition, B. Silva, B. Almeida, FÍSICA 2020 - 22ª Conferência Nacional de Física, Lisboa, 2-5 Sept. 2020.

6.2.5. National/International Patents

National

Magnetic nanosystem and method to produce the nanosystem", Beatriz D. Cardoso, Daniela S. M. Pereira, A. Rita O. Rodrigues, Paulo J. G. Coutinho, Elisabete M. S. Castanheira, Portuguese Patent PT 115474, published in "Boletim de Propriedade Industrial", 26.Oct.2020. International Patent submitted (PCT/IB2020/053947).

International

Material discrimination method involves generating three-dimensional point cloud with polarization information by combining point cloud with polarization data by image processing techniques, - A.I. Holleczek, A.A.A. Carvalho, A.M.R. Correia, P.L.G. Caldelas, A.R. Rodrigues, E.J. Nunes-Pereira, Patent Number WO2020021306-A1, Publ. Date 30 Jan 2020, Patent Assignees: Bosch Car Multimedia Portugal SA, Universidade do Minho.

Terrestrial vehicle range finder device for monitoring field of view from terrestrial vehicle, has electronic data processor for calculating 3D representation comprising light polarization properties over field of view, - A.I. Holleczek, A.A.A. Carvalho, E.J. Nunes-Pereira, A.M.R. Correia, P.L.G. Caldelas, A.R. Rodrigues, H.X.P. Peixoto, Patent Number WO2020021311-A1, Publ. Date 30 Jan 2020, Patent Assignees: Bosch Car Multimedia Portugal SA, Universidade do Minho.

Artificial eye of calibration system for eye-tracker, has feed-back electronic circuit connected between sensor and actuator, arranged to cause rotation of eye model by actuator such that sensor position signal matches reference signal, - F.P.G.F. Ferreira, A.F.T. Macedo, M.I.F. Marques, M.A.N. Sousa, H.T. Correia, B.P.J. Bret, E.J. Nunes-Pereira, Patent Number WO2020016631-A1, Publ. Date 23 Jan 2020, Patent Assignees: Bosch Car Multimedia Portugal SA, Universidade do Minho.

Adaptive filtering module for use in LIDAR system of automotive assemblies, has processing module provided with processing unit to correlate in real-time information collected by temperature module and data stored in database module,- A.I. Holleczek, A.A.A. Carvalho, A.M.R. Correia, P.L.G. Caldelas, A.R. Rodrigues, T. Knecht, N. Heussner, E.J. Nunes-Pereira, Patent Number WO2020002975-A1, Publ. Date 02 Jan 2020, Patent Assignees: Bosch Car Multimedia Portugal SA, Universidade do Minho.

6.2.6. Spin Off

SPM Nanosolutions, Lda. - Superparamagnetic Nanotechnological Solutions for Advanced Therapies and Environment" – 2nd Prize Santa Casa Challenge 2020, April 2020. Team: Ana Rita Rodrigues, Beatriz Cardoso, Carlos Magalhães and Ricardo Fernandes, supervised by Paulo J. G. Coutinho and Elisabete M. S. Castanheira Coutinho.

Entrepreneurship Project MAG2Clean – Finalist of Program +Plus/+Seed of "Casa do Impacto" 2020 (Santa Casa da Misericórdia de Lisboa), Nov. 2020. Team: Ana Rita Rodrigues, B. Cardoso, Carlos Magalhães and Ricardo Fernandes, supervised by Paulo J. G. Coutinho.

SPM Nanosolutions, Lda. - Superparamagnetic Nanotechnological Solutions for Advanced Therapies and Environment" – Invited Participation in the Virtual Exhibition Greenfest, 28-30 May 2020, Mosteiro de Tibães, Braga.

BPatch: Bionanostructured Patch; Entrepreneurship project. Team: Ana Rita Pereira Caldas, Maria João Fernandes Faria and Eduarda Fernandes; supervised by R. Machado, Carla Martins Lopes and Marlene Lúcio.
EyeOnDrug - Nanotechnologic solutions for drug screening and formulations development; Entrepreneurship project promoted by T. B. Soares, E. Fernandes, supervised by R. Machado and M. Lúcio.

6.2.7. Supervision of Research Students

6.2.7.1. PhD projects completed in 2020

Author	Supervisor	Title	Host institution/Program	Reference	Starting Date
César Rui de Freitas Bernardo	Michael Belsley, Mikhail Vasilevskiy	Linear and Nonlinear Properties owing to the interactions of Elementary Excitations in Nanostructures	Doctoral Program in Physics (MAP-Fis)	SFHR/BD/102616/2014	01/04/2015
Danilo Pedrelli	Danilo Alves Nuno Miguel Machado Reis Peres	Propriedade óticas do grafeno na proximidade de folhas metálicas	Doctoral Program in Physics (MAP-Fis) - CAPES	CAPES	
Ricardo Daniel Pereira da Costa	Stéphane Clain, J. Miguel Nóbrega (IPC)	Innovative Computational Rheology Methods for Advanced Polymer Processing Applications	Doctoral Program in Science and Engineering of Polymers and Composites		
Ícaro Jael Mendonça Moura	Ricardo Mendes Ribeiro	Estudo de heteroestruturas de materiais bidimensionais	Doctoral Program in Physics (MAP-Fis)		

6.2.7.2. PhD projects in progress in 2020

Author	Supervisor	Title	Host institution/Program	Reference	Starting Date
Andreia Marina de Sousa Almeida	Bruno Sarmento (i3S), Marlene Lúcio, S. Schwartz (CIBBIM, Barcelona)	Mucoadhesive camptothecin polymeric micelles as nanodelivery systems for oral chemotherapy to treat colorectal cancer	Doctoral Program in Biomedical Sciences, ICBAS, Univ. Porto	SFRH/BD/118721/2016	
Balaji Sompalle	Pedro Alpuim	Fabrication of a photodetector based on 2D vertical Van der Waals heterostructures	Doctoral Program in Physics (MAP-Fis)	OWN	01/10/2015
Beatriz Dias Cardoso	Elisabete M.S. Castanheira Coutinho, V. Cardoso and S. Lanceros-Méndez	Microfluidic evaluation of drug-loaded magnetoliposomes as multifunctional platforms for advanced cell therapies	Doctoral Program in Materials Engineering	SFRH/BD/141936/2018	01/10/2018
Bruna Machado da Silva	Bernardo Almeida, João Pedro Araújo (FCUP), Armandina Lopes (IFIMUP)	Naturally Layered Perovskyte Heterostructures	Doctoral Program in Physics (MAP-Fis)	UMINHO/BI/194/2019	17/05/2019
Bruno Rodrigues Pacheco e Murta	Nuno Peres, Joaquín Rossier (INL)	Quantum Many-Body Ground States via Digital Quantum Simulation	Doctoral Program in Physics (MAP-Fis)	2020.08444.BD	01/02/2020
Carlos Fernandes	Nuno Peres, Ernesto Galvão	Understanding and overcoming limitations of linear-optical quantum computation	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/150770/2020	01/11/2020
Celso Joel Oliveira Ferreira	Bruno Silva (INL), C. Botelho (CEB), M. Elisabete Oliveira	Microfluidics for size-controlled cationic liposome-DNA complexes: going beyond the universal transfection curve	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/149199/2019	01/10/2019
Cláudia Vanessa Dias Reis	Stéphane Clain, Maria Ana Baptista	Structural Behaviour due To Successive Earthquake and Tsunami Actions	Doctoral Program in Science and Engineering of Polymers and Composites	SFRH/BD/137531/2018	
Diana Isabel Faria Meira	Filipe Vaz, Joel Borges and Vitor Correlo (ICVS/3B's)	Development of nanoplasmonic thin film biosensors with enhanced sensitivity for detection of Ochratoxin-A.	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/143262/2019	01/01/2020

Eduarda Barbosa Fernandes	Marlene Lúcio, Vanessa Cardoso and Senentxu Lanceros-Mendez	BIOMYSKIN – Biomimicry profiling supporting drug discovery for topical applications	Doctoral Program in Materials Engineering	SFRH/BD/147938/2019	01/10/2019
Gonçalo Filipe Santos Catarina	Nuno Peres, Joaquín Rossier (INL)	Emergent correlated electronic phases in van der Waals heterostructures	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/138806/2018	01/01/2019
Irina Soraia Rainho Rio	Paulo José Gomes Coutinho	Lipid nanocarriers containing magnetic/gold nanoparticles coated with mesoporous silica for application in SCC skin cancer therapy	Doctoral Program in Materials Engineering	2020.04431.BD	01/02/2021
João Miguel Peixoto Oliveira	Bernardo Almeida, Leonard Francis (INL)	Multiferroic bilayer composites for coupled magnetic-electric-optical functionalization	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/146886/2019	01/03/2020
João Pedro dos Santos Pires	Bruno Amorim, João M. V. Parente Lopes (FCUP)	Non-Equilibrium Quantum Transport and Ultrafast Dynamics at the Mesoscopic Scale	Doctoral Program in Physics (MAP-Fis)	PD/BD/142774/2018	
José Diogo Guimarães	M. Vasilevskiy	No title	Doctoral Program in Physics (MAP-Fis)		
Marta Sofia Vilela Barreira Teixeira	Alice Carvalho (CQUM), Elisabete Coutinho	Development of a drug carrier nanosystem for a new anticancer drug and optimization of the new drug	Doctoral Program Applied Chemistry	2020.04975.BD	01/11/2020
Maurício Quintela	Nuno Peres	Excitons in two-dimensional materials and van der Waals Heterostructures	Doctoral Program in Physics (MAP-Fis)		
Patrícia Daniela Cabral da Silva	Pedro Alpuim	Immuno-field-effect transistor platforms based on 2D materials for early detection of biomarkers of ischemic stroke	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/128579/2017	01/09/2017
Patrícia Alexandra Pereira da Silva	Joel Borges, Ana Paula Sampaio (CBMA)	Development of nanocomposite ZnO thin films with antibiofilm and antimicrobial properties to prevent pathogens' transmission	Doctoral Program in Molecular and Environmental Biology	2020.08235.BD	01/01/2021
Sérgio Rafael da Silva Veloso	Elisabete M.S. Castanheira Coutinho, P.M.T. Ferreira	Development of multifunctional supramolecular magnetogels for	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/144017/2019	01/10/2019

	(CQUM), M. Correa-Duarte (U. Vigo)	multimodal cancer therapy			
Telma Bezerra Soares	Marlene Lúcio, Bruno Sarmento (i3S) and Hélder A. Santos (Faculty of Pharmacy, Univ. Helsinki)	GraphLightCancer – Graphene Quantum Dots for cancer theranostic	Doctoral Program in Molecular and Environmental Biology	SFRH/BD/138678/2018	01/01/2019
Telma Campos Domingues	Pedro Alpuim, Bruno Costa (ICVS)	Multiplex detection of circulating tumor DNA using graphene electrolyte-gate field-effect transistors	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/08181/2020	01/10/2020
Tiago Alves Queirós	Pedro Alpuim, Jana Nieder (INL)	Single Photons on-Demand from a 2D Materials Heterostructure	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/150646/2020	01/07/2020
Vítor Filipe Henriques da Silva	Pedro Alpuim, Paulo Mendes (DEEIC)	RF graphene technology oscillators for biomedical devices	Doctoral Program in Industrial Electronic Engineering	SFRH/BD/137529/2018	01/01/2019
Viviana Lima de Sousa	Pedro Alpuim, Yuri Kol'enko (INL)	Unconventional Thermoelectrics Based on Self-Organized Nanocrystal Superlattices	Doctoral Program in Materials Engineering	SFRH/BD/143750/2019	01/12/2019

6.2.7.3. MSc projects completed in 2020

Author	**Supervisor**	**Title**	**Host institution/Program**
Ana Isabel Ferreira Lopes	Elisabete M.S. Castanheira Coutinho, A. Gil Fortes (CQUM)	Valorização de extratos de plantas e análogos sintéticos pelo encapsulamento em nanossistemas baseados em lípidos e quitosano	ECUM/MSc Biophysics and Bionanosystems
Ana Lúcia Fernandes da Costa Monteiro	Paulo J. G. Coutinho, Sara Fernandes (CeNTI)	Materiais Poliméricos Funcionais e Inteligentes	ECUM/MSc Biophysics and Bionanosystems
António Kamengo Calianguila	Bernardo Almeida	Filmes compósitos multicamada por ablação laser	ECUM/ MSc Physics
Beatriz A. Ferreira	Nuno M.R. Peres, B. Amorim	Efeito de Purcell em estruturas de grafeno e de antiferromagnetes	ECUM/ MSc Physics
José Nuno dos Santos Gomes	M. Vasilevskiy, N.M.R. Peres	Polaritonics in nanostructures with 2D materials and point emitters	ECUM/ MSc Physics
João Ricardo Gonçalves Martins	Mikhail Vasilevskiy	Study of the Förster Resonance Energy Transfer in Ensembles of Colloidal PbS Quantum Dots Emitting in the Near-Infrared Spectral Range	ECUM/ MSc Physics

Pedro Henrique Oliveira de Melo Santos	Pedro Alpuim, Sascha Sadewasser (INL)	Growth and characterization of $Cu(In,Ga)Se_2$ thin film solar cells with a Cu-rich Cu-In-Ga target	EEUM/ MSc. in Engineering Physics
Raquel Gaudência Dias Andrade	Elisabete M.S. Castanheira Coutinho, M. Côrte-Real (CBMA)	Development of magnetic nanocarriers for enhanced anticancer potential of lactoferrin	ECUM/MSc Biophysics and Bionanosystems
Teresa Isabel Loureiro Fidalgo do Vale Rodrigues	Pedro Alpuim, Elisabete Fernandes (INL)	Assessment of graphene transistors for measurement of stroke relevant biomarker cutoff value	ECUM/MSc Biophysics and Bionanosystems

6.3 Functional and smart materials and surfaces for advanced applications

6.3.1 Researchers

Principal investigator	Martin Andritschky (until June) / Carlos Tavares (from June)
Members	**<u>Effective members</u>** Armando José Barros Ferreira Cacilda Maria Lima de Moura Carlos José de Macedo Tavares Clarisse Marta Oliveira Ribeiro Claudia Jesus Ribeiro Lopes Francisco José Machado de Macedo Joaquim Alexandre dos Santos Almeida de Oliveira Carneiro José Filipe Vilela Vaz José Pedro Basto da Silva Luís António Carvalho Gachineiro da Cunha Luís Silvino Alves Marques Luís Manuel Fernandes Rebouta Manuel Filipe Pereira da Cunha Martins Costa Maria de Jesus Matos Gomes Mário António Caixeiro de Castro Pereira Marta Maria Duarte Ramos Martin Andritschky Pedro Libânio Abreu Martins Pedro Manuel Abreu Martins (Until november) Raquel Diana Carneiro Alves Sandra Maria Fernandes Carvalho Sandra Mariana Silva Marques Senen Lanceros-Mendez Serguey Pyrlin Silvie Oliveira Ribeiro Stanislav Lazarov Ferdov Vasco Manuel Pinto Teixeira **Collaborators with PhD – staff members** António Mário Lourenço da Fonseca Almeida Li-Jian Meng Maria Teresa Pitta de Lacerda-Arôso Mário Jorge Dias Zamith Silva Vanessa Fernandes Cardoso Vitor Manuel Gomes Correia

Other collaborators with PhD

Anura Samantilleke
Augusto Cesar Lima Moreira
Carlos Miguel Silva Costa
Diego Martinez Martinez
Filipe Daniel Fernandes
Flávio Ferreira
Isabel Sofia Melo Pereira (until July)
Juliana Cristina Rodrigues Dias (until Sept.)
Lina Fernanda Ballesteros Giraldo
Margarida Maria Macedo Francesko Fernandes
Maria José Bastos Pires Lima
Pedro Filipe Ribeiro Costa

PhD students (supervised or co-supervised by CFUM researchers)

Ana Catarina Branco Lima
Ana Rita Pereira da Silva
André Gustavo Silva de Macedo
António Castro
Bruna Ferreira Gonçalves
Bruno Alexandre Alves Santos
Catarina Isabel da Silva Oliveira
Daniela Morais
Diogo Albano Cavaleiro Ventura de Carvalho
Diogo Emanuel Carvalho Costa
Diogo Jorge Martins Ramos
Edgar Manuel Neto Carneiro
Estela Marisa oliveira Carvalho
Filipe da Costa Correia
Hugo Higino de Barros Machado Martins Salazar
Iran Gomes da Rocha Segundo
Isabel Alves Lopes
Joana Margarida Fernandes da Silva Ribeiro
João Carlos Pacheco Barbosa
João Luís Rodrigues Teixeira
José David Castro
Juliana Filipa Gouveia Marques
Liliana Sofia Correia Fernandes
Luísa Fialho
Marco Rodrigues
Maria Manuela Carvalho Proença
Marta Adriana Félix Forte
Miguel Alexandre Martins Franco
Nelson Miguel Macedo da Silva Pereira
Rafaela Marques Meira
Ricardo Jorge Brito Gonçalves Pereira
Ricardo José da Silva Lima
Rita de Magalhães Polícia

	Rita Ferreira Sérgio Abílio Pereira Gonçaves Teresa Isabel Marques de Almeida Tiago André Rodrigues Marinho

6.3.2 Brief description of the scientific work carried out within the Research Line in 2020

In 2020 the focus of the overall research resided in the development of materials based on alloy oxides and nitrides and the study of the inherent electrical, magnetic, optical and other physical-chemical properties of these materials, having in mind applications in several types of devices, such as sensors, actuators, battery elements, thermoelectrics, solar absorbers, amongst others. The principal techniques for material development in the form of thin film deposition are magnetron sputtering and laser ablation. A low cost technique by direct inkjet printing has also been recently recurred. Other nano and micro structuring techniques have been employed to functionalize materials. The most important and active examples are:

- Photocatalytic and antimicrobial performance of modified titanium dioxide-based nano materials.
- Metallic Organic Frameworks (MOFs) produced through hydro/solvothermal processes for environmental remediation and monitoring.
- Preparation of nanoplasmonic thin film materials composed by noble metal nanoparticles dispersed in dielectric/semiconductor matrixes (for application in optical gas sensors and biosensors. Development of a high-resolution localized surface plasmon resonance (LSPR) spectroscopy, including a software, for sensing tests.
- Lead-free ferroelectric ceramics and thin films for memory and energy storage applications.
- Transparent magnetoelectric materials for advanced invisible electronic applications
- New materials for energy storage systems such as lithium-ion to be applied battery prototypes.
- Surface engineering of nanostructured Ta surface with incorporation of osteoconductive elements by anodization.
- Selective absorption of solar radiation for high temperature applications with structures based on nitride/oxynitride or ceramic/metal composites.
- Transparent thermoelectric thin films for thermal energy harvesting with high figure of merit.
- Development of micro and nanostructured thin films for temperature and pressure sensor applications and flexible and stretchable metallic/intermetallic-based thin films to for transduction, including capacitive, piezoresistive, thermoresistive, piezoelectric and optical.
- Photocurable and water based inks will be developed for printing conductive, dielectric, magnetic and semiconductor layers with specific figures of merit.
- Printed batteries produced by screen-printing and 3D-printing techniques with focus on polymer binder based on styrene-block-copolymers (SBC) polymers and different ink preparation methods.
- Physically active and adaptive microenvironments based on (chitosan based) shape memory gels and electroactive (PVDF, PHBV, collagen) and magnetoactive (IL and nanoparticle stimulated polymer and gels) scaffolds will be developed for bone, muscle and heart tissue regeneration to be applied in developed (patented) bioreactors.

6.3.3 Future research summary

The future research of this strategic line will provide continuity to most of the present activities within running projects. A special focus will be given to development of multi–functional materials for sensors and actuators, energy and

biomedical applications with focus on piezoelectric and resistive, magnetoeletric materials deposited by printing technologies. Other areas of interest, with potential application in the industry, include R&D in sensors and actuators and battery components, plasmonic nanoparticles for bio-detection, in particular growth and study of novel plasmonic structures with applications in biological and medical science. The future research of this strategic line also comprises the investigation on ferroelectric thin films based on binary oxides, such as ZrO2 and HfO2 for ferroelectric access random access memories (FeRAMs) and energy storage capacitors. In addition, lead-free ferroelectric ceramics and thin films capacitors based on BaCaTiO3-BaZrTiO3 will also be investigated.

In the biomedical applications, the R&D NanoStim Project with the International Partnership of the University of Texas in Austin, will be focused on the development of (nano)sensors based on thin films to be integrated on wearables and used on elderlys' physiotherapy rehabilitation.

LSPR sensors can be optimized to detect chemical, physical or mechanical stimuli, allowing a wide range of fundamental information of on-going processes. Besides LSPR -gas and -biosensors, in the framework of project Nano4bio and 3 PhD thesis, there will be a continuous effort on the research in LSPR thin films using other transduction mechanisms.

Based and expanding the previous works, the main focus is the development of novel approaches and materials to detect, degrade or absorb volatile organic compounds (VOC's) and/or other related environmental hazardous chemicals. The main goal consists in the developing "hybrid" thin-film sensor networks combining in an innovative way two green processes (PVD and Screen Printing) which will allow the development and preparation of a wide variety of different multi-modal sensing systems to control, degrading or absorbing VOC's.

Energetic plasma sources (HIPIMS) will be used to obtain films with higher quality and improved properties. On the other hand, the deposition of protective thin films on 'complex' rubber and cork substrates by magnetron sputtering and Atomic Layer is also a priority in the mainframe of the project 'FORC'. In addition, the Atomic Layer Deposition technique is currently being explored for the deposition of ternary nitrides in the form of MAX phases (M-ERA.NET project ALD4MAX).

Physical Vapor Deposition at Oblique Angles – PVD-OA and printing technologies are used, either alone or in combination, to produce sensors (reducing cost, improving environmental friendliness and performance) that open new routes of integration of the various types of sensors in advanced applications.

Transparent thin film thermoelectrics for thermal energy harvesting are also important in order to render specific devices more self-sustainable and to recover energy wasted as heat.

6.3.4 Publications

6.3.4.1 Regular articles published in ISI/Scopus Journals

A selective solar thermal absorber coating based on W/AlSiTiNx/SiAlTiOyNx /SiAlOx for high temperature applications, A. AL-Rjoub, L. Rebouta, N. F. Cunha, F. Fernandes, N.P. Barradas, E. Alves, Solar Energy, 207 (2020) 192-198, 10.1016/j.solener.2020.06.094

Aging Effect on Functionalized Silver-Based Nanocoating Braided Coronary Stents. Rebelo R, Padrão J, Fernandes M, Carvalho S, Henriques M, Zille A, Fangueiro R. Coatings 2020; 10(12):1234. https://doi.org/10.3390/coatings10121234

All-Printed Piezoresistive Sensor Matrix with Organic Thin-Film Transistors as a Switch for Crosstalk Reduction. Correia, Vitor; Oliveira, Juliana; Perinka, Nikola; Costa, Pedro; Sowade, Enrico; Mitra, Kalyan Y.; Baumann, Reinhard R.; Lanceros-Mendez, Senentxu., ACS Applied Electronic Materials. 2020, 2 (5). http://dx.doi.org/10.1021/acsaelm.0c00214.

Antibacterial Effects of Bimetallic Clusters Incorporated in Amorphous Carbon for Stent Application. I. Carvalho, N. Dias, M. Henriques, S. V. Calderon, P. Ferreira, A. Cavaleiro, S. Carvalho. ACS Applied Materials & Interfaces 12, 22 (2020) 24555–24563. https://doi.org/10.1021/acsami.0c02821

Antimicrobial and Antibiofilm Properties of Fluorinated Polymers with Embedded Functionalized Nanodiamonds, Nunes-Pereira, J., Costa, P., Fernandes, L., Carvalho, E.O., Fernandes, M.M., Carabineiro, S.A.C., Buijnsters, J.G., Tubio, C.R., Lanceros-Mendez, S.; (2020) ACS Applied Polymer Materials, 2 (11), pp. 5014-5024. DOI: 10.1021/acsapm.0c00869

Antimicrobial Properties of Composites of Chitosan-Silver Doped Zeolites. Fabio A. P. Scacchetti, Filipa Fernandes, Artur Ribeiro, Artur Cavaco-Paulo, Joaquim O. Carneiro, Graça M. B. Soares. Journal of Nanoscience and Nanotechnology 20(10) (2020): 6295-6304.DOI: https://doi.org/10.1166/jnn.2020.18574

Au-WO3 nanocomposite coatings for localized surface plasmon resonance sensing. N.M. Figueiredo, F. Vaz, L. Cunha, A. Cavaleiro. Materials 13 (2020) 246. https://dx.doi.org/10.3390%2Fma13010246

Barium-doped zinc oxide thin films as highly efficient and reusable photocatalysts (2020) Jayakrishnan A. R., Alex K. V., Tharakan A. T., Kamakshi K., Silva J. P. B., Prasad M. S., Sekhar K. C., Gomes M. J. M., Chemistry Select, 5 2824-2834. DOI: 10.1002/slct.201904943, https://chemistry-europe.onlinelibrary.wiley.com/doi/abs/10.1002/slct.201904943

Biodegradable hydrogels loaded with magnetically responsive microspheres as 2d and 3d scaffolds, Carvalho, E.O., Ribeiro, C., Correia, D.M., Botelho, G., Lanceros-Mendez, S.; (2020) Nanomaterials, 10 (12), art. no. 2421, pp. 1-12. DOI: 10.3390/nano10122421

Cellulose nanocrystal and water-soluble cellulose derivative based electromechanical bending actuators, Correia, D.M., Lizundia, E., Meira, R.M., Rincón-Iglesias, M., Lanceros-Méndez, S.; (2020) Materials, 13 (10), art. no. 2294, . DOI: 10.3390/ma13102294

Chemical preparation, crystal structure, Hirshfeld surface analysis, spectroscopy, DFT studies, thermal decomposition and magnetic measurements of (C4H12N2)[FeCl3(H2O)3]Cl2, Ines Kadri, Slim Elleuch, Carlos Jose Tavares, Manuel Bañobre-López, Michel François, Walid Rekik, Inorganic Chemistry Communications 112, February 2020, 107748. (https://doi.org/10.1016/j.inoche.2019.107748)

Conventional synthesis of layer-like zeolites with faujasite (FAU) structure and their pathway of crystallization, Ferdov, S. Microporous and Mesoporous Materials 303 (2020) 110263. (IF: 4.551; Q1): DOI: 10.1016/j.micromeso.2020.110263

Design of Ionic-Liquid-Based Hybrid Polymer Materials with a Magnetoactive and Electroactive Multifunctional Response, Fernandes, L.C., Correia, D.M., Fernández, E., Tariq, M., Esperança, J.M.S.S., Lanceros-Méndez, S.; (2020) ACS Applied Materials and Interfaces, 12 (37), pp. 42089-42098. DOI: 10.1021/acsami.0c10746

Development of poly(l-lactic acid)-based bending actuators, Correia, D.M., Fernandes, L.C., Cruz, B.D.D., Botelho, G., de Zea Bermudez, V., Lanceros-Ménde, S.; (2020) Polymers, 12 (5), art. no. 1187, . DOI: 10.3390/POLYM12051187

Development of stacked porous tantalum oxide layers by anodization, Fialho, L.; Almeida Alves, C. F.; Marques, L. S.; Carvalho, S., Applied Surface Science 511 (2020) 145542. DOI: https://doi.org/10.1016/j.apsusc.2020.145542

Dataset for additional information on the evaluation of thermal properties of thin films by IR radiometry using a comprehensive set of Zr-O-N thin films (2020) Silva-Oliveira, C.I. da, Martinez-Martinez, D., Couto, F.M., Cunha, L., Macedo F.; Data in Brief art. no. 105291 DOI: 10.1016/j.dib.2020.105291 (http://hdl.handle.net/1822/68765)

Dielectric relaxation dynamics in poly(vinylidene fluoride)/Pb(Zr<inf>0</inf><inf>·</inf><inf>53</inf>Ti<inf>0.47</inf>)O<inf>3</inf> composites, Costa, C.M., Sabater i Serra, R., Andrio Balado, A., Gómez Ribelles, J.L., Lanceros-Méndez, S.; (2020) Polymer, 204, art. no. 122811, . DOI: 10.1016/j.polymer.2020.122811

Dry electrodes for surface electromyography based on architectured titanium thin films. M.S. Rodrigues, P. Fiedler, N. Küchler, R.P. Domingues, C. Lopes, J. Borges, J. Haueisen, F. Vaz. Materials, 13 (2020) 2135. https://doi.org/10.3390/ma13092135

Effect of bacterial nanocellulose binding on the bactericidal activity of bovine lactoferrin, Padrão, J., Ribeiro, S., Lanceros-Méndez, S., Rodrigues, L.R., Dourado, F.; (2020) Heliyon, 6 (7), art. no. e04372, . DOI: 10.1016/j.heliyon.2020.e04372

Effect of heat treatment on electrical and surface properties of tungsten oxide thin films grown by HFCVD technique (2021) Tan G.-L., Tang D., Dastan D., Jafari A., Silva, J. P. B., Yin X.-T., Materials Science in Semiconductor Processing 122, 105506. DOI: 10.1016/j.mssp.2020.105506, https://www.sciencedirect.com/science/article/pii/S1369800120314402

Effect of Ionic Liquid Content on the Crystallization Kinetics and Morphology of Semicrystalline Poly(vinylidene Fluoride)/Ionic Liquid Blendsm Correia, D.M., Costa, C.M., Rodríguez-Hernández, J.C., Tort Ausina, I., Biosca, L.T., Torregrosa Cabanilles, C., Meseguer-Duenãs, J.M., Lanceros-Méndez, S., Gomez Ribelles, J.L.; (2020) Crystal Growth and Design, 20 (8), pp. 4967-4979. DOI: 10.1021/acs.cgd.0c00042

Electrical transport of sprayed In2S3:Ag thin films (2020) Tiss, B., Bouguila, N., Kraini, M., Khirouni, K., Vazquez-Vazquez, C., Cunha, L., Moura, C., Alaya, S.; MATERIALS SCIENCE IN SEMICONDUCTOR PROCESSING, 114 art. no. 105080. DOI: 10.1016/j.mssp.2020.105080

Electroactive γ-phase, enhanced thermal and mechanical properties and high ionic conductivity response of poly (vinylidene fluoride)/cellulose nanocrystal hybrid nanocomposites, Lizundia, E., Reizabal, A., Costa, C.M., Maceiras, A., Lanceros-Méndez, S.; (2020) Materials, 13 (3), art. no. 743, . DOI: 10.3390/ma13030743

Energy harvesting technologies for structural health monitoring of airplane components—a review (2020) Zelenika S., Z. Hadas, Bader S., Becker T., Gljušcic P., Hlinka J., Janak L., Kamenar, E., Ksica, F., Kyratsi T., Louca L., Mrlik M., Osmanovic A., Pakrashi V., Rubes O., Ševecek O., Silva, J. P. B., Tofel T., Trkulja B., Unnthorsson R., Velagic J., Vrcan Ž., Sensors 20, 6685. DOI: 10.3390/s20226685, https://www.mdpi.com/1424-8220/20/22/6685

Energy storage performance of ferroelectric ZrO2 film capacitors: effect of HfO2:Al2O3 dielectric insert layer (2020) Silva J. P. B., Silva J. M. B., Sekhar K. C., Palneedi, H., Istrate M. C., Negrea R. F., Ghica C., Chahboun A., Pereira M., Gomes M. J. M., J. Mater. Chem. A 8, 14171-14177. DOI: 10.1039/D0TA04984K, https://pubs.rsc.org/en/content/articlelanding/2020/ta/d0ta04984k#!divAbstract

Enhanced photocatalytic activity of au/TiO<inf>2</inf> nanoparticles against ciprofloxacin, Martins, P., Kappert, S., Le, H.N., Sebastian, V., Kühn, K., Alves, M., Pereira, L., Cuniberti, G., Melle-Franco, M., Lanceros-Méndez, S.; (2020) Catalysts, 10 (2), art. no. 234, . DOI: 10.3390/catal10020234

Enhancing the Sensitivity of Nanoplasmonic Thin Films for Ethanol Vapor Detection. M.S. Rodrigues, J. Borges, F. Vaz. Materials, 13 (2020) 870. https://dx.doi.org/10.3390%2Fma13040870

Evolution of the mechanical properties of Ti-based intermetallic thin films doped with different metals to be used as biomedical devices. C. Lopes, C. Gabor, D. Cristea, R. Costa, R.P. Domingues, M.S. Rodrigues, J. Borges, E. Alves, N.P. Barradas, D. Munteanu, F. Vaz. Appl. Surf. Sci. 505 (2020) 144617. https://doi.org/10.1016/j.apsusc.2019.144617

Fabrication, characterization and implementation of thermo resistive ticu(N, O) thin films in a polymer injection mold, Oliveira, E., Silva, J.P., Laranjeira, J., Macedo, F., Lanceros-Mendez, S., Vaz, F., Ferreira, A.; (2020) Materials, 13 (6), art. no. 1423, . DOI: 10.3390/ma13061423

Functional Piezoresistive Polymer-Composites Based on Polycarbonate and Polylactic Acid for Deformation Sensing Applications, Dios, J.R., Gonzalo, B., Tubio, C.R., Cardoso, J., Gonçalves, S., Miranda, D., Correia, V., Viana, J.C., Costa, P., Lanceros-Méndez, S.; (2020) Macromolecular Materials and Engineering, 305 (12), art. no. 2000379, . DOI: 10.1002/mame.202000379

Galvanic Oxidation of Bimetallic Zn-Fe Nanoparticles for Oxygen Scavenging ,Castro, A., Carvalho, I., Marques, L., Ferreira, P. J., Cavaleiro, A., Carvalho, S., & Calderon V, S. Galvanic Oxidation of Bimetallic Zn-Fe Nanoparticles for Oxygen Scavenging. Applied Surface Science, 537 (May 2020), 147896. URL: https://doi.org/10.1016/j.apsusc.2020.147896

HfO2–Al2O3 dielectric layer for a performing metal–ferroelectric–insulator–semiconductor structure with a ferroelectric 0.5Ba(Zr0.2Ti0.8)O3-0.5(Ba0.7Ca0.3)TiO3 thin film (2020) Silva J. P. B., Sekhar K. C., Veltruská K., Matolín V., Negrea R. F., Ghica C., Oliveira M. J. S., Moreira J. A., Pereira M., Gomes M. J. M. Gomes, ACS Appl. Electron. Mater. 2, 9, 2780–2787. DOI: 10.1021/acsaelm.0c00480, https://pubs.acs.org/doi/10.1021/acsaelm.0c00480

High dielectric constant UV curable polyurethane acrylate/indium tin oxide composites for capacitive sensing, Mendes-Felipe, C., Barbosa, J.C., Gonçalves, S., Pereira, N., Costa, C.M., Vilas-Vilela, J.L., Lanceros-Mendez, S.; (2020) Composites Science and Technology, 199, art. no. 108363, . DOI: 10.1016/j.compscitech.2020.108363

High temperature tribological behaviour of TiSiN(Ag) films deposited by HiPIMS in DOMS mode, D.Cavaleiro, D.Veeregowda, A.Cavaleiro, S.Carvalho, F.Fernandes, Surface and Coatings Technology, 399 (2020) 126176. DOI: https://doi.org/10.1016/j.surfcoat.2020.126176

High-frequency magnetoimpedance effect in meander-line trilayered films. A.S. de Melo, F. Bohn, A. Ferreira, F. Vaz, M.A. Correa. J. Magn. Magn. Mater. 515 (2020) 167166. https://doi.org/10.1016/j.jmmm.2020.167166

Hydrolytic degradation and cytotoxicity of poly(lactic-co-glycolic acid)/multiwalled carbon nanotubes for bone regeneration, Díaz, E., Puerto, I., Sandonis, I., Ribeiro, S., Lanceros-Mendez, S.; (2020) Journal of Applied Polymer Science, 137 (10), art. no. 48439, . DOI: 10.1002/app.48439

Hydrophobic modification of bacterial cellulose using oxygen plasma treatment and chemical vapor deposition, Leal, S., Cristelo, C., Silvestre, S., Fortunato, E., Sousa, A., Alves, A., Correia, D.M., Lanceros-Mendez, S., Gama, M.; (2020) Cellulose, 27 (18), pp. 10733-10746. DOI: 10.1007/s10570-020-03005-z

Influence of morphology and microstructure on the tribological behavior of arc deposited CrN coatings for the automotive industry, Ferreira, R., Carvalho, Ó., Sobral, L., Carvalho, S., & Silva, F.. Surface and Coatings Technology, 155, 126047 (2020). Quartile: Q1 Impact factor: 3.192 URL: https://doi.org/10.1016/j.surfcoat.2020.126047

Influence of Nb-doping on the local structure and thermoelectric properties of transparent TiO2:Nb thin films, Joana M Ribeiro, Filipe C Correia, Alexei Kuzmin, Inge Jonane, Minghua Kong, Alejandro R Goni, Sebastian Reparaz, Aleksandrs Kalinko, Edmund Welter, Carlos J Tavares, Journal of Alloys and Compounds 838 (2020) 155561. Impact Factor: 4.175. (https://doi.org/10.1016/j.jallcom.2020.155561)

Ionic liquid based Fluoropolymer solid electrolytes for Lithium-ion batteries, Serra, J.P., Pinto, R.S., Barbosa, J.C., Correia, D.M., Gonçalves, R., Silva, M.M., Lanceros-Mendez, S., Costa, C.M.; (2020) Sustainable Materials and Technologies, 25, art. no. e00176, . DOI: 10.1016/j.susmat.2020.e00176

Ionic Liquid–Polymer Composites: A New Platform for Multifunctional Applications, Correia, D.M., Fernandes, L.C., Martins, P.M., García-Astrain, C., Costa, C.M., Reguera, J., Lanceros-Méndez, S.; (2020) Advanced Functional Materials, 30 (24), art. no. 1909736, . DOI: 10.1002/adfm.201909736

Joining Alumina to Titanium Alloys Using Ag-Cu Sputter-Coated Ti Brazing Filler, Omid Emadinia, Aníbal Guedes, Carlos José Tavares and Sónia Simões, Materials 13 (21) (2020) 4802. Impact Factor: 3.057 (https://doi.org/10.3390/ma13214802)

Lithium-ion battery separator membranes based on poly(L-lactic acid) biopolymer, Barbosa, J.C., Reizabal, A., Correia, D.M., Fidalgo-Marijuan, A., Gonçalves, R., Silva, M.M., Lanceros-Mendez, S., Costa, C.M.; (2020) Materials Today Energy, 18, art. no. 100494, . DOI: 10.1016/j.mtener.2020.100494

Magnetic and high-dielectric-constant nanoparticle polymer tri-composites for sensor applications, Mooti, A., Costa, C.M., Maceiras, A., Pereira, N., Tubio, C.R., Vilas, J.L., Besbes-Hentati, S., Lanceros-Mendez, S.; (2020) Journal of Materials Science, 55 (34), pp. 16234-16246. DOI: 10.1007/s10853-020-05165-6

Magnetic bioreactor for magneto-, mechano-and electroactive tissue engineering strategies, Castro, N., Fernandes, M.M., Ribeiro, C., Correia, V., Minguez, R., Lanceros-Méndez, S.; (2020) Sensors (Switzerland), 20 (12), art. no. 3340, pp. 1-13. DOI: 10.3390/s20123340

Magnetic proximity sensor based on magnetoelectric composites and printed coils, Pereira, N., Lima, A.C., Correia, V., Perinka, N., Lanceros-Mendez, S., Martins, P.; (2020) Materials, 13 (7), art. no. 1729, . DOI: 10.3390/ma13071729

Magnetic response dependence of ZnO based thin films on Ag doping and processing architecture, J. G. S. Santos, M. A. Correa, A. Ferreira, B. R. Carvalho, R. B. da Silva, F. Bohn, S. Lanceros-Méndez and F. Vaz, 2020, Materials, 13(13), 2907. https://doi.org/10.3390/ma13132907

Magnetically Activated Electroactive Microenvironments for Skeletal Muscle Tissue Regeneration, Ribeiro, S., Ribeiro, C., Carvalho, E.O., Tubio, C.R., Castro, N., Pereira, N., Correia, V., Gomes, A.C., Lanceros-Méndez, S.; (2020) ACS Applied Bio Materials, 3 (7), pp. 4239-4252. DOI: 10.1021/acsabm.0c00315

Magnetoelectrics: Three centuries of research heading towards the 4.0 industrial revolution, Pereira, N., Lima, A.C., Lanceros-Mendez, S., Martins, P.; (2020) Materials, 13 (18), art. no. 4033, . DOI: 10.3390/ma13184033

Metal-Organic Framework Based PVDF Separators for High Rate Cycling Lithium-Ion Batteries, Valverde, A., Gonçalves, R., Silva, M.M., Wuttke, S., Fidalgo-Marijuan, A., Costa, C.M., Vilas-Vilela, J.L., Laza, J.M., Arriortua, M.I., Lanceros-Méndez, S., Fernández De Luis, R.; (2020) ACS Applied Energy Materials, 3, 12, 11907–11919. DOI: 10.1021/acsaem.0c02044

Microstructure tailoring for enhancing the energy storage performance of 0.98[0.6Ba(Zr0.2Ti0.8)O3-0.4(Ba0.7Ca0.3)TiO3]-0.02BiZn1/2Ti1/2O3 ceramic capacitors (2020) Jayakrishnan A. R., Yadava P. V. K., Silva J. P. B., Sekhar K. C., Journal of Science: Advanced Materials and Devices 5, 119-124. DOI: 10.1016/j.jsamd.2019.12.001,https://www.sciencedirect.com/science/article/pii/S2468217919302382

Modelling of elastic modulus of CaZrO3-MgO composites using isotropic elastic and anisotropic models (2020)Nunes-Pereira, J., Carneiro, P.M.C., Maceiras, A., Baudín, C., Silva, A.P.; Journal of the European Ceramic Society, 40(20), art. no. 5882-5890. DOI: 10.1016/j.jeurceramsoc.2020.05.050

Modulation of the magnetoimpedance effect of ZnO:Ag/NiFe heterostructures by thermal annealing, Ferreira, A., Correa, M.A., Lanceros-Méndez, S., Bohn, F., Vaz, F.; (2020) Journal of Materials Science, 55 (14), pp. 5961-5968. DOI: 10.1007/s10853-020-04427-7

Morphological, optical and photovoltaic characteristics of MoSe2/SiOx/Si heterojunctions (2020) Silva J. P. B., Marques C. A., Viana A. S., Santos L. F., Gwozdz K., Popko E., Connolly J. P., Veltruská K., Matolín V., Conde O., Sci. Rep. 10, 1215. DOI: 10.1038/s41598-020-58164-7, https://www.nature.com/articles/s41598-020-58164-7

Morphology dependence degradation of electro-and magnetoactive poly(3-hydroxybutyrateco-hydroxyvalerate) for tissue engineering applications, Amaro, L., Correia, D.M., Martins, P.M., Botelho, G., Carabineiro, S.A.C., Ribeiro, C., Lanceros-Mendez, S.; (2020) Polymers, 12 (4), art. no. 953, . DOI: 10.3390/POLYM12040953

Multilayer passive radiative selective cooling coating based on Al/SiO2/SiNx/SiO2/TiO2</SiO2 prepared by dc magnetron sputtering, Cunha, N.F., AL-Rjoub, A., Rebouta, L., Vieira, L.G., Lanceros-Mendez, S.; (2020) Thin Solid Films, 694, art. no. 137736, . DOI: 10.1016/j.tsf.2019.137736

N2-H2 capacitively coupled radio-frequency discharges at low pressure. Part I. Experimental results: Effect of the H2 amount on electrons, positive ions and ammonia formation, Chatain, A., Jimenez-Redondo, M., Vettier, L., Marques, L, Cernogora, G., Plasma Sources Science and Technology, 2020, 29(8), 085019. DOI: https://doi.org/10.1088/1361-6595/ab9b1a

N2-H2capacitively coupled radio-frequency discharges at low pressure: II. Modeling results: The relevance of plasma-surface interaction, Jiménez-Redondo, M., Chatain, A., Guaitella, O., Alves, L.L., Marques, L. Plasma Sources Science and Technology, 2020, 29(8), 085023. DOI: https://doi.org/10.1088/1361-6595/ab9b1b

Nanocomposite Au-ZnO thin films: Influence of gold concentration and thermal annealing on the microstructure and plasmonic response. P. Pereira-Silva, J. Borges, M.S. Rodrigues, J.C. Oliveira, E. Alves, N.P. Barradas, J.P. Dias, A. Cavaleiro, F. Vaz. Surf. Coatings Technol. 385 (2020) 125379. https://doi.org/10.1016/j.surfcoat.2020.125379

NANOPTICS: In-depth analysis of NANomaterials for OPTICal localized surface plasmon resonance Sensing. M.S. Rodrigues, R.M.S. Pereira, M.I. Vasilevskiy, J. Borges, F. Vaz. SoftwareX. 12 (2020) 10522. https://doi.org/10.1016/j.softx.2020.100522

Optically transparent silk fibroin/silver nanowire composites for piezoresistive sensing and object recognitions, Reizabal, A., Gonçalves, S., Pereira, N., Costa, C.M., Pérez, L., Vilas-Vilela, J.L., Lanceros-Mendez, S.; (2020) Journal of Materials Chemistry C, 8 (37), pp. 13053-13062. DOI: 10.1039/d0tc03428b

Optimization of Au:CuO Nanocomposite Thin Films for Gas Sensing with High-Resolution Localized Surface Plasmon Resonance Spectroscopy. M. Proença, M.S. Rodrigues, J. Borges, F. Vaz. Anal. Chem. 92 (2020) 4349–4356. https://doi.org/10.1021/acs.analchem.9b05153

Over 6% Efficient Cu(In,Ga)Se2 Solar Cell Screen-Printed from Oxides on Fluorine-Doped Tin Oxide (2020), Sousa, V., Gonçalves, B.F., Rosen, Y.S., Virtuoso, J., Anacleto, P., Cerqueira, M.F., Modin, E., Alpuim, P., Lebedev, O.I., Magdassi, S., Sadewasser, S., Kolen'ko, Y.,; ACS Appl. Energy Mater. 3 (4), 3120-3126. DOI: 10.1021/acsaem.9b01999

Overview on thermoactive materials, simulations and applications, Fernandes, L., Fernández, E., Martins, P., Ferreira, N., Antunes, P., Lanceros-Mendez, S.; (2020) Journal of Materials Science, 55 (3), pp. 925-946. DOI: 10.1007/s10853-019-04113-3

Passivation and dissolution mechanisms in ordered anodic tantalum oxide nanostructures, C. F. Almeida Alves, S. Calderon V., P. J. Ferreira, L. Marques and S. Carvalho. Applied Surface Science, vol. 513, May 2020. DOI: https://doi.org/10.1016/j.apsusc.2020.145575

Patterned piezoelectric scaffolds for osteogenic differentiation, Marques-Almeida, T., Cardoso, V.F., Gama, M., Lanceros-Mendez, S., Ribeiro, C.; (2020) International Journal of Molecular Sciences, 21 (21), art. no. 8352, pp. 1-8. DOI: 10.3390/ijms21218352

Perovskite ferroelectric thin film as an efficient interface to enhance the photovoltaic characteristics of Si/SnOx heterojunctions (2020) Silva J. P. B., Vieira E. M. F., Silva J. M. B., Gwozdz K., Figueiras F., Veltruská K., Matolín V., Istrate C., Ghica C., Sekhar K. C., Kholkin A., Goncalves L., Chahboun A., Pereira, M., J. Mater. Chem. A, 8, 11314-11326. DOI: 10.1039/D0TA02198A.

Photocatalytic and antimicrobial multifunctional nanocomposite membranes for emerging pollutants water treatment applications, Salazar, H., Martins, P.M., Santos, B., Fernandes, M.M., Reizabal, A., Sebastián, V., Botelho, G., Tavares, C.J., Vilas-Vilela, J.L., Lanceros-Mendez, S.; (2020) Chemosphere, 250, art. no. 126299, DOI: 10.1016/j.chemosphere.2020.126299

Photocatalytic Bi2O3/TiO2:N Thin Films with Enhanced Surface Area and Visible Light Activity, Luís P. Dias, Filipe C. Correia, Joana M. Ribeiro and Carlos J. Tavares, Coatings 10 (5) (2020) 445. (https://doi.org/10.3390/coatings10050445)

Physically Active Bioreactors for Tissue Engineering Applications, Castro, N., Ribeiro, S., Fernandes, M.M., Ribeiro, C., Cardoso, V., Correia, V., Minguez, R., Lanceros-Mendez, S.; (2020) Advanced Biosystems, 4 (10), art. no. 2000125, . DOI: 10.1002/adbi.202000125

Physicochemical and Rheological Properties of aTransparent Asphalt Binder Modified with Nano-TiO2. Iran Rocha Segundo, Salmon Landi Jr, Alexandros Margaritis, Georgios Pipintakos, Elisabete Freitas, Cedric Vuye, Johan Blom, Tom Tytgat, Siegfried Denys, Joaquim Carneiro. Nanomaterials 2020, 10(11), 2152. DOI: https://doi.org/10.3390/nano10112152

Plasma-treated Bombyx mori cocoon separators for high-performance and sustainable lithium-ion batteries, Pereira, R.F.P., Gonçalves, R., Gonçalves, H.M.R., Correia, D.M., Costa, C.M., Silva, M.M., Lanceros-Méndez, S., de Zea Bermudez, V.; (2020) Materials Today Sustainability, 9, art. no. 100041, . DOI: 10.1016/j.mtsust.2020.100041

Poly(vinylidene) fluoride membranes coated by heparin/collagen layer-by-layer, smart biomimetic approaches for mesenchymal stem cell culture, Guillot-Ferriols, M., Rodríguez-Hernández, J.C., Correia, D.M., Carabineiro, S.A.C., Lanceros-Méndez, S., Gómez Ribelles, J.L., Gallego Ferrer, G.; (2020) Materials Science and Engineering C, 117, art. no. 111281, . DOI: 10.1016/j.msec.2020.111281

Polymer-based actuators: back to the future, Martins, P., Correia, D.M., Correia, V., Lanceros-Mendez, S.; (2020) Physical Chemistry Chemical Physics, 22 (27), pp. 15163-15182. DOI: 10.1039/d0cp02436h

Polymer-based membranes for oily wastewater remediation, Zioui, D., Salazar, H., Aoudjit, L., Martins, P.M., Lanceros-Méndez, S.; (2020) Polymers, 12 (1), art. no. 42, . DOI: 10.3390/polym12010042

Polymers for advanced lithium-ion batteries: State of the art and future needs on polymers for the different battery components, Costa, C.M., Lizundia, E., Lanceros-Méndez, S.; (2020) Progress in Energy and Combustion Science, 79, art. no. 100846, . DOI: 10.1016/j.pecs.2020.100846

Porous tantalum oxide with osteoconductive elements and antibacterial core-shell nanoparticles: a new generation of materials for dental implants.Fialho, L., Grenho, L., Fernandes, M. H., & Carvalho, S. Materials Science and Engineering: C (2020), 111761. URL: https://doi.org/10.1016/j.msec.2020.111761

Preparation of Plasmonic Au-TiO2 Thin Films on a Transparent Polymer Substrate. M.S. Rodrigues, D.I. Meira, C. Lopes, J. Borges, F. Vaz. Coatings. 10 (2020) 227. https://doi.org/10.3390/coatings10030227

Recent advances and future challenges in printed batteries, Costa, C.M., Gonçalves, R., Lanceros-Méndez, S.; (2020) Energy Storage Materials, 28, pp. 216-234. DOI: 10.1016/j.ensm.2020.03.012

Reconfigurable 3D-printable magnets with improved maximum energy product, Brito-Pereira, R., Ribeiro, C., Peřinka, N., Lanceros-Mendez, S., Martins, P.; (2020) Journal of Materials Chemistry C, 8 (3), pp. 952-958. DOI: 10.1039/c9tc06072c

Robust resistive switching performance of pulsed laser deposited SiC/Ag/SiC tri-layer thin films deposited on a glass substrate (2020) Kamakshi K., Silva J. P. B., Kumar N. S. K., Sekhar K.C. MRS Communications 10, 353-358. Doi: 10.1557/mrc.2020.34, https://doi.org/10.1557/mrc.2020.34

Role of Au incorporation in the electrochemical behavior of Ag/a:C nanocomposite coatings. S.A. Salehizadeh, I. Carvalho, R. Serra, S. Calderon V, P.J. Ferreira, A. Cavaleiro, S. Carvalho. Surface & Coatings Technology 401 (2020) 126240. https://DOI.org/10.1016/j.surfcoat.2020.126240

Scalable colloidal synthesis of Bi2Te2.7Se0.3plate-like particles give access to a high-performing n-type thermoelectric material for low temperature application, Nagendra S. Chauhan, Oleg I. Lebedev, Kirill Kovnir, Sergey V. Pyrlin, Luis S. A. Marques, Marta M. D. Ramos, Brian A. Korgel, Yury V. Kolen'ko, Nanoscale Adv., 2020, 2, 5699

Selective Antimicrobial Performance of Biosynthesized Silver Nanoparticles by Horsetail Extract Against E. coli, Miljković, M., Lazić, V., Davidović, S., Milivojević, A., Papan, J., Fernandes, M.M., Lanceros-Mendez, S., Ahrenkiel, S.P., Nedeljković, J.M.; (2020) Journal of Inorganic and Organometallic Polymers and Materials, 30 (7), pp. 2598-2607. DOI: 10.1007/s10904-019-01402-x

Semiconductor/relaxor 0–3 type composites: A novel strategy for energy storage capacitors (2020) Jayakrishnan A. R., Silva J. P. B., Kamakshi K., Annapureddy V., Mercioniu I. F., Sekhar K. C., Journal of Science: Advanced Materials and Devices (in press). DOI: 10.1016/j.jsamd.2020.09.012, https://www.sciencedirect.com/science/article/pii/S2468217920300861

Silica nanoparticles surface charge modulation of the electroactive phase content and physical-chemical properties of poly(vinylidene fluoride) nanocomposites, Ribeiro, S., Meira, R.M., Correia, D.M., Tubio, C.R., Ribeiro, C., Baleizão, C., Lanceros-Méndez, S.; (2020) Composites Part B: Engineering, 185, art. no. 107786, . DOI: 10.1016/j.compositesb.2020.107786

Silk Fibroin Based Magnetic Nanocomposites for Actuator Applications, Reizabal, A., Costa, C.M., Pereira, N., Pérez-Álvarez, L., Vilas-Vilela, J.-L., Lanceros-Méndez, S.; (2020) Advanced Engineering Materials, 22 (6), art. no. 2000111, . DOI: 10.1002/adem.202000111

Silk fibroin magnetoactive nanocomposite films and membranes for dynamic bone tissue engineering strategies, Reizabal, A., Brito-Pereira, R., Fernandes, M.M., Castro, N., Correia, V., Ribeiro, C., Costa, C.M., Perez, L., Vilas, J.L., Lanceros-Méndez, S.; (2020) Materialia, 12, art. no. 100709, . DOI: 10.1016/j.mtla.2020.100709

Spray-printed magnetoelectric multifunctional composites, Martins, P., Nunes, J.S., Oliveira, J., Peřinka, N., Lanceros-Mendez, S.; (2020) Composites Part B: Engineering, 187, art. no. 107829, . DOI: 10.1016/j.compositesb.2020.107829

Surface Charge-Mediated Cell-Surface Interaction on Piezoelectric Materials, Ribeiro, S., Puckert, C., Ribeiro, C., Gomes, A.C., Higgins, M.J., Lanceros-Méndez, S.; (2020) ACS Applied Materials and Interfaces, 12 (1), pp. 191-199. DOI: 10.1021/acsami.9b17222

Surface functionalization of 3D printed structures: Aesthetic and antibiofouling properties, Castro, J.D., Carneiro, E., Marques, S. M., Figueiredo, B., Pontes, A. J., Sampaio, A. M., Carvalho, I., Henriques, M., Cruz, P. J. S. & Carvalho, Surface and Coatings Technology, vol. 386, no. February, p. 125464, Mar. 2020, doi: 10.1016/j.surfcoat.2020.125464..

Surface functionalization of polypropylene (PP) by chitosan immobilization to enhance human fibroblasts viability. D.S. Morais, B. Ávila, C. Lopes, M.A. Rodrigues, F. Vaz, A. V. Machado, M.H. Fernandes, R.M. Guedes, M.A. Lopes, Polym. Test. 86 (2020) 106507. doi:10.1016/j.polymertesting.2020.106507. https://doi.org/10.1016/j.polymertesting.2020.106507

Tailoring electroactive poly(vinylidene fluoride-co-trifluoroethylene) microspheres by a nanoprecipitation method, Macedo, A.S., Carvalho, E.O., Cardoso, V.F., Correia, D.M., Tubio, C.R., Fidalgo-Marijuan, A., Botelho, G., Lanceros-Méndez, S.; (2020) Materials Letters, 261, art. no. 127018, . DOI: 10.1016/j.matlet.2019.127018

Tailoring Electrospun Poly(l -lactic acid) Nanofibers as Substrates for Microfluidic Applications, Pimentel, E.S., Brito-Pereira, R., Marques-Almeida, T., Ribeiro, C., Vaz, F., Lanceros-Mendez, S., Cardoso, V.F.; (2020) ACS Applied Materials and Interfaces, 12 (1), pp. 60-69. DOI: 10.1021/acsami.9b12461

Tailoring silk fibroin separator membranes pore size for improving performance of lithium ion batteriesm Reizabal, A., Gonçalves, R., Fidalgo-Marijuan, A., Costa, C.M., Pérez, L., Vilas, J.-L., Lanceros-Mendez, S.; (2020) Journal of Membrane Science, 598, art. no. 117678, . DOI: 10.1016/j.memsci.2019.117678

The Potential of Graphene Nanoplatelets in the Development of Smart and Multifunctional Ecocomposites, P. Pereira, D. P. Ferreira, J.C. Araújo, A. Ferreira, R. Fangueiro, Polymers 2020, 12(10), 2189. https://doi.org/10.3390/polym12102189

The role of CNC surface modification on the structural, thermal and electrical properties of poly(vinylidene fluoride) nanocomposites, Rincón-Iglesias, M., Lizundia, E., Correia, D.M., Costa, C.M., Lanceros-Méndez, S.; (2020) Cellulose, 27 (7), pp. 3821-3834. DOI: 10.1007/s10570-020-03067-z

Triboelectric energy harvesting response of different polymer-based materials, Rodrigues-marinho, T., Castro, N., Correia, V., Costa, P., Lanceros-méndez, S.; (2020) Materials, 13 (21), art. no. 4980, pp. 1-12. DOI: 10.3390/ma13214980

Tribological performance of hybrid surfaces: dimple-shaped anodized Al alloy surfaces coated with WS-CF sputtered thin films, Rodrigues, S.P., Carvalho, S., Cavaleiro, A.. International Journal of Advanced Manufacturing Technology, (2020). Quartile: Q1 Impact factor: 2.496 URL: https://doi.org/10.1007/s00170-020-05326-6

Tribological solutions for engine piston ring surfaces: an overview on the materials and manufacturing, Ferreira, R., Martins, J., Carvalho, Ó., Sobral, L., Carvalho, S., & Silva, F. Materials and Manufacturing Processes, (2019), 1–23.

Tuning properties of cerium dioxide nanoparticles by surface modification with catecholate-type of ligands, Lazić, V., Živković, L.S., Sredojević, D., Fernandes, M.M., Lanceros-Mendez, S., Ahrenkiel, S.P., Nedeljković, J.M.; (2020) Langmuir, 36 (33), pp. 9738-9746. DOI: 10.1021/acs.langmuir.0c01163

Ultra-Short Pulse HiPIMS: A Strategy to Suppress Arcing during Reactive Deposition of SiO2 Thin Films with Enhanced Mechanical and Optical Properties (2020) Tiron, V., Velicu, I.-L., Matei, T., Cristea, D., Cunha, L., Stoian, G.; COATINGS, 10 (7) art. no. 633. DOI: 10.3390/coatings10070633 (http://hdl.handle.net/1822/66137)

UV curable nanocomposites with tailored dielectric response, Mendes-Felipe, C., Rodrigues-Marinho, T., Vilas, J.L., Lanceros-Mendez, S.; (2020) Polymer, 196, art. no. 122498, . DOI: 10.1016/j.polymer.2020.122498

Vineyard calcium sprays induce changes in grape berry skin, firmness, cell wall composition and expression of cell wall-related genes, Martins, V., Garcia, A., Alhinho, A.T., Costa, P., Lanceros-Méndez, S., Costa, M.M.R., Gerós, H.; (2020) Plant Physiology and Biochemistry, 150, pp. 49-55. DOI: 10.1016/j.plaphy.2020.02.033

Water-Based Graphene Inks for All-Printed Temperature and Deformation Sensors, Franco, M., Alves, R., Perinka, N., Tubio, C., Costa, P., Lanceros-Mendéz, S.; (2020) ACS Applied Electronic Materials, 2 (9), pp. 2857-2867. DOI: 10.1021/acsaelm.0c00508

Other Articles

Quantificando as vantagens dos carros elétricos: caso de estudo (2020), H. Castro, J.C. Barbosa, R. Gonçalves, S. Lanceros-Mendez, C.M. Costa, Indústria e Ambiente. (https://www.industriaeambiente.pt/noticias/quantificando-vantagens-carros-eletricos-caso-de-estudo)

A energia solar fotovoltaica – uma das fileiras das energias renováveis mais importantes para Portugal. Joaquim Carneiro, Mário Passos. Renováveis Magazine 43 (2020) 48-54. (ISSN 1647-6255).

Controlo dinâmico de temperatura no processo de moldação por injeção, Jorge Laranjeira, Cláudia Macedo, Ricardo Simões, Luís Faria, António Baptista, Armando Ferreira, Filipe Vaz, Carlos Patacas, Ricardo Alexandre, 04-2020, Revista o Molde, pág. 60. https://www.cefamol.pt/index.php?id=85&idn=273

6.3.4.2 Books and book chapters

Books

Science Education. Discovering and understanding the wonders of Nature. Costa MF, Dorrío BV (Eds.); Hands-on Science Network, 2020. ISBN: 978-84-8158-841-5, http://hdl.handle.net/1822/67621

Sistemas Fotovoltaicos – Fundamentos sobre Dimensionamento. Joaquim Carneiro, Mário Passos. Engebook (2020). ISBN: 9789899017207.

Chapters

Gas Sensing with Nanoplasmonic Thin Films Composed of Nanoparticles (Au, Ag) Dispersed in a CuO Matrix Manuela Proença, Marco S. Rodrigues, Joel Borges and Filipe Vaz, "", Coatings to Improve Optoelectronic Devices, Selected articles published by MDPI (Coatings), Pp. 91-101. ISBN 978-3-03928-334-7 (Hbk), ISBN 978-3-03928-335-4 (PDF), https://doi.org/10.3390/books978-3-03928-335-4

Superhydrophobic Asphalt Pavements: Surface Improvement, Segundo, I. R., Landi, S., Freitas, E., Branco, V. C., Costa, M. F., Carneiro, J., Proceedings of EOSAM2020. In EPJ Web of Conferences (Vol. 238, p. 12012). EDP Sciences, August 2020. DOI: 10.1051/epjconf/202023812012 http://hdl.handle.net/1822/67624

Lead-based and lead-free ferroelectric ceramic capacitors for electrical energy storage, in: D. Maurya, A. Pramanick, D. Viehland (Eds.), H. Palneedi, M. Peddigari, A. Upadhyay, J. P. B. Silva, G.-T. Hwang, J. Ryu, Ferroelectric Materials for Energy Harvesting and Storage, Woodhead Publishing Series in Electronic and Optical Materials, Elsevier, 2021, pp. 279-356. ISBN: 978-0-08-102802-5 https://www.sciencedirect.com/science/article/pii/B9780081028025000091

Electroactive poly(vinylidene fluoride) based materials: recent progress, challenges and opportunities, in: B. Amedury and S. Fomin (Eds), C. M. Costa, V. F. Cardoso, R. Brito-Pereira, P. Martins, D. M. Correia, V. Correia, C. Ribeiro, P. M. Martins, S. Lanceros-Méndez, Fascinating Fluoropolymers and Their Applications, Elsevier. 2020, pp. 1-43. ISBN: 9780128218730. https://doi.org/10.1016/B978-0-12-821873-0.00001-1

Introduction to piezoelectricity and electrospun piezoelectric materials and devices, in: Jian Fang, Tong Lin (Eds.), T. Rodrigues-Marinho, A. C. Lima, P. Martins, P. Costa, S. Lanceros-Mendez, Energy Harvesting Properties of Electrospun Nanofibers, IOP Publishing Ltd 2020, pp. 2.1-2.41. ISBN: 978-0-7503-2005-4

Overview on lightweight, multifunctional materials, C. Costa, P. Costa, S. Lanceros-Mendez, Advanced Lightweight Multifunctional Materials, Woodhead Publishing in Materials, Paperback ISBN: 9780128185018 eBook ISBN: 9780128185025

Additive manufacturing of multifunctional materials, P. Martins, V. Correia, S. Lanceros-Mendez, Advanced Lightweight Multifunctional Materials, Woodhead Publishing in Materials, Paperback ISBN: 9780128185018 eBook ISBN: 9780128185025

Magnetic field into multifunctional materials: magnetorheological, magnetostrictive and magnetocaloric, P. Martins, S. Lanceros-Mendez, Advanced Lightweight Multifunctional Materials, Woodhead Publishing in Materials, Paperback ISBN: 9780128185018 eBook ISBN: 9780128185025

Multifunctional materials based on smart hydrogels for biomedical and 4D applications, S. Maiz-Fernandez, L. Perez-Alvarez, L. Ruiz-Rubio, J. L. Vilas-Vilela, S. Lanceros-Mendez, Advanced Lightweight Multifunctional Materials, Woodhead Publishing, UK, 2020, pp.317-343. ISBN: 9780128185018

High deformation multifunctional composites: materials, processes, and applications, in: P. Costa, C.M. Costa, S. Lanceros-Mendez (Eds), P. Costa, J. Nunes-Pereira, C.R. Tubio, J.R. Dios, S. Lanceros-Mendez, Advanced Lightweight Multifunctional Materials, Woodhead Publishing, UK, 2020, pp.317-343. ISBN: 9780128185018

Functional, lightweight materials: outlook, future trends and challenges, C. Costa, P. Costa, S. Lanceros-Mendez, Advanced Lightweight Multifunctional Materials, Woodhead Publishing in Materials, Paperback ISBN: 9780128185018 eBook ISBN: 9780128185025

Magnetic materials for magnetoelectric coupling: An unexpected journey (2020), Lima, A.C., Pereira, N., Martins, P., Lanceros-Mendez, S.; Handbook of Magnetic Materials, 29, pp. 57-110. DOI: 10.1016/bs.hmm.2020.09.002

Piezoelectric Polymer Composites for Sensors and Actuators, Carvalho, E., Fernandes, L., Costa, C.M., Lanceros-Méndez, S., in Reference Module in Materials Science and Materials Engineering. Encyclopedia of Materials Composites, 2020, Elsevier, DOI: 10.1016/B978-0-12-819724-0.00005-7, ISBN: 978-0-12-803581-8

Synthetic polymer-based membranes for lithium-ion batteries, in: A.F. Ismail, W.N.W. Salleh, and N. Yusof (Eds), P.M. Martins, J. Nunes-Pereira, S. Lanceros-Mendez, C.M. Costa, Synthetic Polymeric Membranes for Advanced Water Treatment, Gas Separation, and Energy Sustainability, Elsevier, Amsterdan, 2020, pp. 383-415. ISBN: 978-0-12-818485-1

Edition

Advanced Lightweight Multifunctional Materials, 1st Edition, Editors: Pedro Costa Carlos Costa Senentxu Lanceros-Mendez, Imprint: Woodhead Publishing, Published Date: 24th November 2020, Paperback ISBN: 9780128185018, eBook ISBN: 9780128185025

Research and innovation". UMinho Editora ISBN: 978-989-8974-18-1, F. Vaz - Editor responsável pela edição do livro https://ebooks.uminho.pt/index.php/uminho/catalog/book/16, DOI: https://doi.org/10.21814/uminho.ed.16., Publicação em 14 julho 2020.

6.3.4.3 Conference Proceedings with Pier Review appearing in the ISI Database

Design for Additive Manufacturing of Mechanical Connections Toward Hybrid Products, Sampaio, Á. M., Gonçalves, R., Lima, A., Cruz, P. J. S., Figueiredo, B., Carvalho, S., & Pontes, A. J. In M. Di Nicolantonio, E. Rossi, & T. Alexander (Eds.), Advances in Additive Manufacturing, Modeling Systems and 3D Prototyping (pp. 418–427), (2020). Cham: Springer International Publishing. URL: https://doi.org/10.1007/978-3-030-20216-3_39

Application of composite coatings as protection/contacting layers for metallic highchromium- content SOFC interconnect material, Viktar Sauchuk (1), Nikolai Trofimenko, Stefan Megel, Stefan Rothe,Jochen Schilm, Martin Andritschky, Michael Hiller, Claudia Goebel, Jan Froitzheim, Mihails Kusnezoff EFCF 2020, 20-23 Oct., Lucerne Switzerland, ISBN 978-3-905592-25-2

Proceedings of the European Optical Society Annual Meeting 2020, EOSAM2020. Humberto Michinel, Manuel F. Costa and Orlando Frazao (Eds), EPJ Web of Conferences, Volume 238 (2020) https://doi.org/10.1051/epjconf/202023800001, http://hdl.handle.net/1822/67623

Cone geometry optimization and thermal behavior for lithium-ion battery separators Miranda, D., Goncalves, R., Miranda, F., Vilhena, E., Lanceros-Mendez, S., Costa, C.M.; (2020) AIP Conference Proceedings, 2293, art. no. 260006, . DOI: 10.1063/5.0026453

Theoretical simulation of different 3D separator geometries for lithium-ion batteries Miranda, D., Gonçalves, R., Miranda, F., Almeida, A.M., Costa, C.M., Lanceros-Mendez, S.; (2020) AIP Conference Proceedings, 2293, art. no. 260005, . DOI: 10.1063/5.0026447

Electroactive polymer membranes as substrates for point-of-care devices, Brito-Pereira, R., Macedo, A.S., Lanceros-Méndez, S., Cardoso, V.F.; (2020) MicroTAS 2020 - 24th International Conference on Miniaturized Systems for Chemistry and Life Sciences, pp. 410-411.

Superhydrophobic Asphalt Pavements: Surface Improvement. Iran Rocha Segundo1, Salmon Landi Jr., Elisabete Freitas, Verônica Castelo Branco, Manuel F. M. Costa, Joaquim Carneiro. EPJ Web of Conferences 238, 12012 (2020). DOI: https://doi.org/10.1051/epjconf/202023812012

Conhecimentos de Matemática básica de graduandos nos anos iniciais de Engenharia: desafios, fragilidades e enfrentamentos possíveis. Lucas Duarte Oliveira, Tiago Clarimundo Ramos, Joaquim Carneiro, Salmon Landi Jr. Revista BOEM 8(16) (2020) 134-152, DOI: https://doi.org/10.5965/2357724X08162020134

6.3.5 Conference Presentations

6.3.5.1 Invited talks delivered at Conferences (International/National)

International

Robotics and STEM education in Portugal, Manuel F. M. Costa, The International Forum of Artificial Intelligence and STEM Education, IFAISE2020, Xi'an, China (online conference), December 26, 2020.

Photocatalytic Bi2O3/TiO2:N Thin Films with Enhanced Surface Area and Visible Light Activity, Carlos Tavares: International Conference on Nanomaterials (Online), European Nanoscience and Nanotechnology Association - ENNA, EU, May 19 2020. (https://www.materials-conference.com/)

Magnetically active composites for all-printed electronics applications" A. C. Lima, N. Perinka, N. Pereira, V. Correia, P. Martins, S. Lanceros-Mendez. TMS 2020 Annual Meeting & Exhibition, 23-27/02/2020, S. Diego, USA

Ceramic-Ag nanocomposite coatings produced by magnetron sputtering: effect of Ag nanoparticles on functional properties", Sandra Carvalho, 17th International Conference on Plasma Surface Engineering - Special PSE, Erfurt, Alemanha, 7 – 10 setembro 2020

I webinar PPGCEM 2020 - Smart and multifunctional thin film materials response and integration for advanced applications, Universidade Federal do Rio Grande do Norte – UFRN, 16/10/2020. https://ethereal-memory-8181.glideapp.io/

6.3.5.2 Contributed talks delivered at Conferences (International/National)

International

Transparent thermoelectric thin films for thermal energy harvesting applications, 18th International Conference on Thin Films & 18th Joint Vacuum Conference, November 22-26 2020, Budapest, Hungary

Basic Hands-on Introduction to Holography for Ophthalmology and Optometry Undergraduate Students, Manuel F. M. Costa, 17th International Conference on Hands-on Science, Science Education. Discovering and understanding the wonders of Nature, Viana do Castelo, Portugal, July 13-17, 2020; Hands-on Science. Science Education. Discovering and understanding the wonders of Nature; Costa MF, Dorrío BV (Eds.); ISBN 978-84-8158-841-5, Hands-on Science Network, 2020.http://hdl.handle.net/1822/67625

Superhydrophobic Asphalt Pavements: Surface Improvement, Segundo, I. R., Landi, S., Freitas, E., Branco, V. C., Costa, M. F., Carneiro, J., European Optical Society Annual Meeting 2020, EOSAM2020, Porto, Portugal, September 7-11, 2020 http://hdl.handle.net/1822/67624

Modification of a transparent binder for road pavements using TiO2 nanoparticles, Iran Rocha Segundo, Salmon Landi Jr., Alexandros Margaritis, Georgios Pipintakos, Elisabete Freitas, Cedric Vuye, Johan Blom, Tom Tytgat, Siegfried Denys, Manuel Filipe Costa and Joaquim Carneiro, NanoPT2020, online conference, September 23-24, 2020

Thriving Narrow Band Gap Ferroelectric Oxides for Photovoltaic Applications: Bi2ZnTiO6 Thin Films Deposited by RF Sputtering, F. Figueiras, J. R. Fernandes, J. P. B. Silva, A. C. Lourenço, P. B. Tavares, CMD 2020GEFES online, August 31- September 4, 2020.

Thriving Narrow Band Gap Ferroelectric Oxides for Photovoltaic Applications: Bi2ZnTiO6 Thin Films Deposited by RF Sputtering, F. G. Figueiras, J. R. Fernandes, J. P. B. Silva, A. C. Lourenço, P. B. Tavares, 3rd International Conference on Nanomaterials Science and Mechanical Engineering University of Aveiro, Portugal, July 7-10, 2020.

Hybrid fibrous materials for advanced tissue engineering", B. Hermenegildo, R.M. Meira, D. Correia, Leyre Pérez-Álvarez, José L. Vilas, Senentxu Lanceros-Méndez, NANOPT ONLINE CONFERENCE, 23-24 September 2020.

Electroactive Polymer Membranes As Substrates For Point-of-Care Devices, Ricardo Brito-Pereira, André S. Macedo, Senentxu Lanceros-Méndez, Vanessa F. Cardoso, MicroTAS2020, Online, October 2020.

Point-of-care device for multiplexed detection of chronic obstructive pulmonary disease biomarkers in sputum, E.O., Carvalho, M., Gutiérrez-Capitán, A., Baldi, T., Tzanov, J., Hoyo, A., Bassegoda, A., Gedanken, I., Perelshtein, M., Wei, V.F., Cardoso, S., Lanceros-Méndez, C., Fernández-Sánchez, LungCheck:. CLINAM Summit, online October 26-28, 2020, Basel, Switzerland.

First insights of a novel antibacterial and cytocompatible porous Ta2O5 surface doped with zinc oxide nanoparticles, Luísa Fialho, L. Grenho, M. H. Fernandes, S. Calderon V., Sandra Carvalho, 17th International Conference on Plasma Surface Engineering - Special PSE, Erfurt, Alemanha, 7 – 10 setembro 2020.

Multifunctional coatings with antibiofouling properties, José D. Castro, Isabel Carvalho,, Mariana Henriques, S. Carvalho, 17th International Conference on Plasma Surface Engineering - Special PSE, Erfurt, Alemanha, 7 – 10 setembro 2020.

Modification of a transparent binder for road pavements using TiO2 nanoparticles. ROCHA SEGUNDO, I.; LANDI Jr.; MARGARITIS, A.; PIPINTAKOS, G.; FREITAS, ELISABETE; VUYE, C.; BLOM, J.; TYTGAT, T.; DENYS, S.; COSTA, MANUEL F. M.; CARNEIRO, JOAQUIM. NPTO2020 - nanoPT Online conference. 23 September 2020 - 24 September 2020

National

Atomistic simulations of silver diffusion within a titanium nitride matrix", V. Lenzi, A. Cavaleiro, F. Fernandes, D. Cavaleiro, L. Marques, , UTAPT 2020 - UT Austin Portugal Annual Conference, Braga, Portugal, 7-8 October 2020

Photovoltaic efficiency enhancement of Si/SnOx heterojunctions by ferroelectric perovskite oxide thin film interface, J. P. B. Silva, E. M. F. Vieira, K. Gwozdz, F. G. Figueiras, K. Veltruská, V. Matolín, M. C. Istrate, C. Ghica, K. C. Sekhar, A. L. Kholkin, L. M. Goncalves, A. Chahboun, M. Pereira, Física 2020 online, 2-5 September, 2020.

6.3.6 National/international Patents

National

S. Lanceros-Méndez, N. Castro, V. Correia, C. Ribeiro (2020); "Modular magnetically driven bioreactor system for cellular cultures and biomedical applications"; Portugal, Patent No. 20201000018824, Instituto Nacional de Propriedade Industrial.

International

Thermal sensor for monitoring soldering temperature of electronic component, has first metallic layer connected to second metallic layer, where metallic layers are formed of dissimilar metallic materials and overlaid in sensor region Inventor(s): N. Manninen; P.M. Pinto da Costa, D.F.de Barros Alves, D.F. C. Cerejeira, J. C. Machado Viana, L. Rebouta, S. M. Ferreira da Cruz Patent Number: WO2020016636-A1 Patent Assignee: BOSCH CAR MULTIMEDIA PORTUGAL SA; UNIV DO MINHO Derwent Primary Accession Number: 2020-090718

6.3.7 SPIN-OFFS, START-UPS

Wise4Automation, LDA. 26/3/2020

6.3.8 Supervision of Research Students

6.3.8.1 PhD projects completed in 2020

Author	Supervisor	Title	Host institution/Program	Reference	Starting Date
Ander Reizabal Lopez-Para,	Senentxu Lanceros Mendez, Leyre Perez Alvarez	Tailoring Bombyx mori Silk as Multifunctional Material for Advanced Applications	PhD In Sciences chemistry	BCMaterials	17/12/2020
Bogdan Postolnyi	João Pedro Araújo, Alexander Pogrebnjak and Luis Rebouta	Superhard protective coatings with enehanced Tougness: multi-layered nanocomposite metal nitrides	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/129614/2017	01/09/2017
Cristian Mendes Felipe	Senentxu Lanceros-Mendez, José Luis Vilas Vilela	Multifunctional photocurable advanced materials for electronics and sensing applications	PhD In Sciences chemistry	BCMaterials	20/10/2017
Jivago Serrado Gomes Aguiar Nunes	Senentxu Lanceros-Mendez and Gerardo Rocha	"Polymer based sensors fabricated by printing technologies"	Doctoral Program in Materials Engineering	SFRH/BDE/103649/2014	09/02/2015
Juliana Oliveira	Senentxu Lanceros-Mendez and José Gerardo da Rocha	Radiation detectors based on printing technologies	Doctoral Program in Materials Engineering	SFRH/BD/98219/2013	09/02/2014
Nélson José Fernandes Castro	Rikardo Minguez Gabiña, Senentxu Lanceros-Mendez	Design, Construction and Validation of a New Generation of Bioreactors for Tissue Engineering Applications	Ph.D. - Graphic Design and Engineering Projects	BCMaterials	16/11/2017
Salmon Landi Júnior	Joaquim Carneiro, Pier Parpot	Tratamento de efluentes industriais através de processos fotocatalíticos com dióxido de titânio	PhD In Sciences Physics	CAPES	
Sylvie Ribeiro	Prof. Senentxu Lanceros-	Tailoring electroactive polymer nanocomposites for	Doctoral Program in Materials Engineering	SFRH/BD/111478/2015	01/10/2015

	Mendez, Prof. Andreia Castro Gomes e Prof. Carlos Baleizão	novel muscle tissue engineering applications.			
Veniero Lenzi	Luís Silvino Marques	Multiscale modelling and simulation of soft matter systems	PhD In Sciences Physics	SFRH/BD/128666/2017	13/11/2017

6.3.8.2 PhD projects in progresso in 2020

Author	Supervisor	Title	Host institution/Program	Reference	Starting Date
Ana Catarina Branco Lima	P. Martins, Yury Kohlenko, S. Lanceros Mendez	"New inks for printed electronic components and sensing devices: integration into a fully printed magnetic sensor"	Doctoral Program in Materials Engineering	SFRH/BD/132624/2017	01/09/2017
Ana Rita Pereira da Silva	Maria Madalena dos Santos Alves, Senen Lanceros Mendez	Photocatalytic degradation of recalcitrant micropollutants: novel nanomaterials and strategies for process optimization and toxicity evaluation	Doctoral Program in Materials Engineering	SFRH/BD/131905/2017	01/09/2017
André Gustavo Silva de Macedo	Clarisse Marta Oliveira Ribeiro Senen Lanceros Mendez	Multiresponsive hydrogels as a novel approach for bone cancer therapies	Doctoral Program in Materials Engineering	2020.09218.BD	01/05/2021
António Castro	Luís Marques	Oxidation mechanism of bimetallic ZnFe nanoparticles	SURFPROTEC - Programa de Doutoramento Nacional em Engenharia e Proteção de Superfícies	UMINHO/BD/48/2017	01/12/2016
Bruna Ferreira Gonçalves	S. Lanceros-Mendez, Y. Kolen'ko. G. Botelho	Novel printable photovoltaic systems based on Cu(In,Ga)Se2 chalcopyrite	Doctoral Program in Materials Engineering	SFRH/BD/121780/2016	01/01/2017
Bruno Alexandre Alves Santos	Senentxu Lanceros-Mendez; Margarida	Bruno Santos	Doctoral Program in Materials Engineering	2020.09630.BD	01/11/2020

	Maria Macedo Francesko Fernandes; Pedro Martins				
Catarina Isabel da Silva Oliveira	Diego Martinez-Martinez, Luís Cunha, Jeff de Hossom	Deposition and characterization of sputtered Zr-O-N based films for fine tuning of their physical properties	Doctoral Program in Materials Engineering	OWN	06/03/2018
Daniela Morais	Vítor Vilar e Francisca Moreira (FEUP), Carlos Tavares (UMinho)	A continuous-flow photoelectrocatalytic static mixer microreactor applied to the synthesis of high-value organic chemicals	Doctoral Program Chemical and Biological Engineering (FEUP)	SFRH/BD/146476/2019	01/07/2020
Diogo Albano Cavaleiro Ventura de Carvalho	Sandra Maria Fernandes Carvalho	Development of Ti-Si-N(Ag) self-lubricant coatings with optimized Ag Contents for Cutting tools	SURFPROTEC - Programa de Doutoramento Nacional em Engenharia e Proteção de Superfícies	UMINHO/BD/29/2016	01/12/2016
Diogo Emanuel Carvalho Costa	Filipe Vaz, Graça Minas, Paula Sampaio	Development of Optical (T-LSPR) Biosensors, based in nanoplasmonic thin films, for early pathogen detection	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/136279/2018	01/01/2019
Diogo Jorge Martins Ramos	Sandra Carvalho	Development of new coatings for dental implants	SURFPROTEC - Programa de Doutoramento Nacional em Engenharia e Proteção de Superfícies	UMINHO/BD/56/2018	10/05/2018
Edgar Manuel Neto Carneiro	Luís Silvino Alves Marques	Desafios Reach: revestimentos alternativos ao Cr hexavalente	SURFPROTEC - Programa de Doutoramento Nacional em Engenharia e Proteção de Superfícies	UMINHO/BD/30/2016	01/12/2016
Estela Marisa oliveira Carvalho	Margarida Fernandes, Clarisse Ribeiro, Senentxu	Improving Titanium-Bone interfaces with electroactive and antimicrobial materials	Doctoral Program in Materials Engineering	SFRH/BD/145455/2019	01/11/2019

	Lanceros-Mendez	for effective orthopedic implants			
Hugo Higino de Barros Machado Martins Salazar	S.Ferdov, S. Lanceros Mendez	New generation of polymer composite membranes for water purification	Doctoral Program in Materials Engineering	SFRH/BD/122373/2016	04/09/2017
Iran Gomes da Rocha Segundo	Elisabete Freitas, Joaquim Carneiro	Superfícies de pavimentos rodoviários ecológicas, fotocatalíticas, hidrofóbicas e autolimpantes	Doctoral Program in Materials Engineering	SFRH/BD/137421/2018	01/09/2018
Isabel Alves Lopes	Rui Vilar, Luis Rebouta	Optical and tribological properties of femtosecond laser nanotextures surfaces	Doctoral Program AdvaMTech	PD/BD/143034/2018	
Joana Margarida Fernandes da Silva Ribeiro	Carlos Tavares (UMinho) e Torben Boll (Karlsruhe Institute of technology, Alemanha)	Transparent thermoelectric titanium dioxide-based thin films for thermal energy harvesting	Doctoral Program in Materials Engineering	SFRH/BD/147221/2019	01/01/2020
João Carlos Pacheco Barbosa	C. Costa, S. Lanceros Mendez	Development of three component solid-polymer electrolytes for energy storage applications	Doctoral Program in Materials Engineering	SFRH/BD/140842/2018	01/10/2018
João Luís Rodrigues Teixeira	Maria Gabriela Coutinho, S. Lanceros-Mendez	Multifunctional Air filters based on emerging natural polymers for VOCs removal	Doctoral Program in Materials Engineering	SFRH/BD/141642/2018	01/10/2018
José David Castro	Sandra Maria Fernandes Carvalho	Development of new coatings with antifouling properties	Doctoral Program in Materials Engineering	UMINHO/BI/420/2018	01/02/2019
Juliana Filipa Gouveia Marques	Carlos Tavares	Difusão controlada de compostos ativos do interior de microcápsulas mediada por ativação solar	Doctoral Program in Materials Engineering	SFRH/BD/112868/2015	01/01/2016
Liliana Sofia	Daniela Correia, P.	Magnetic ionic liquid/polymer	Doctoral Program in Materials Engineering	SFRH/BD/145345/2019	01/11/2019

Correia Fernandes	Martins, S. Lanceros-Mendez	composites for printable sensors and actuators			
Luísa Fialho	Sandra Carvalho	Design of new biocompatible osseointegrated and antimicrobial dental implant	SURFPROTEC - Programa de Doutoramento Nacional em Engenharia e Proteção de Superfícies	UMINHO/BD/31/2016	01/12/2016
Marco Rodrigues	Filipe Vaz, Joel Borges	Nano-designed LSPR Thin Films Using GLAD in Reactive Magnetron Sputtering, for Optical Sensing	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/118684/2016	01/04/2017
Maria 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	Doctoral Program in Physics (MAP-Fis)	SFRH/BD/137076/2018	01/12/2018
Marta Adriana Félix Forte	Carlos Tavares (UMinho) e Rui Silva (UAveiro)	Encapsulation of phytonutrients in polymeric microcapsules coated with photocatalytic nano materials	Doctoral Program AdvaMTech	PD/BD/128491/2017	01/01/2017
Miguel Alexandre Martins Franco	Senentxu Lanceros-Mendez, Asal Kiazadeh	Development of printed and biocompatible synaptic devices	Doctoral Program in Materials Engineering	SFRH/BD/145741/2019	06/01/2020
Nelson Miguel Macedo da Silva Pereira	V. Correia, G. Rocha, S. Lanceros-Mendez	Desenvolvimento de tintas multifuncionais para implementação em aplicações interativas	Electronics and Computers Engineering Doctoral Program	SFRH/BD/131729/2017	01/09/2017
Rafaela Marques Meira	Clarisse Ribeiro, Senentxu Lanceros-Mendez, Daniela M. Correia	Electroactive polymer materials based heart-on-a-chip as a novel approach for cardiac tissue engineering	Doctoral Program in Materials Engineering	SFRH/BD/148655/2019	01/11/2019

Ricardo Jorge Brito Gonçalves Pereira	V. F. Cardoso, S. Lanceros-Méndez	A new generation of microfluidic platforms based on smart and multifunctional materials	Doctoral Program in Materials Engineering	SFRH/BD/140698/2018	01/10/2018
Ricardo José da Silva Lima	João Nunes Pereira Senen Lanceros Mendez	Advanced self-sensing polymer composites with self-healing capabilities for high responsibility applications	Doctoral Program in Materials Engineering	2020.07010.BD	02/12/2020
Rita de Magalhães Policia	Daniela Correia,Pedro Libanio Martins, S. Lanceros Mendez	High-performance printable luminescent and chromic materials for improved device integration	Doctoral Program in Materials Engineering	2020.07956.BD	01/10/2020
Rita Ferreira	Filipe Samuel, Sandra Carvalho	New processing technologies for improved compression piston rings performance	Leaders for Technical Industries	SFRH/BDE/110654/2015	01/02/2016
Sérgio Abílio Pereira Gonçaves	Pedro Branco, Senentxu Lanceros-Méndez, José Gerardo Vieira Rocha	New generation of interactive platforms based on novel printed smart materials	Electronics and Computers Engineering Doctoral Program	UMINHO/BI/337/2019	01/09/2019
Teresa Isabel Marques de Almeida	Clarisse Ribeiro, Senentxu Lanceros-Mendez, Hugo Fernandes	Biodegradable electroactive polymer materials as a novel approach for neural tissue engineering applications	Doctoral Program in Materials Engineering	SFRH/BD/141136/2018	01/10/2018
Tiago André Rodrigues Marinho	Senentxu Lanceros-Mendez Pedro Costa	Printable energy harvester systems for wearable sensors devices	Doctoral Program in Materials Engineering	SFRH/BD/140242/2018	01/10/2018
Filipe da Costa Correia	Carlos Tavares (UMinho) e Adélio Mendes (UPorto)	Desenvolvimento de filmes finos heteroestruturados de ZnO com propriedades termoelétricas, para aplicação em células solares	Doctoral Program in Materials Engineering	SFRH/BD/111720/2015	08/09/2015

6.3.8.3 MSc projects completed in 2020

Author	Supervisor	Title	Host institution/Program
Jaffer Bressan Borinelli	Elisabete Freitas, Joaquim Carneiro	Desenvolvimento de revestimento antigelo, fotocatalítico e autolimpante para pavimentos flexíveis com o uso de nano e micromateriais	EEUM
Ana Rita Ferreira da Costa Machado	Filipe Vaz, Cláudia Lopes	*Desenvolvimento de elétrodos/sensores de base polimérica, funcionalizados com filmes finos de Ti(N)Cu, integrados num sistema de aquisição de atividade muscular para aplicações biomédicas*	EEUM/ Mestrado Integrado em Eng. Física
Paulo Tchimbumbuanjila Boano	Senen Lanceros Méndez, Pedro Martins e Carlos Tavares	Desenvolvimento e Optimização de Nanopartículas Fotocatalíticas	Mestrado em Física
Joana Moreira,	Margarida M Fernandes, Clarisse Ribeiro (University of Minho)	Uma nova abordagem antimicrobiana à base de materiais eletroativos	EEUM
Claudia Silva	Margarida M Fernandes, Senentxu Lanceros-Mendez, Rosemeyre Amaral Cordeiro	Bone tissue engineering using smart electroactive biomaterials	Universiudade de Coimbra

7.Appendices

7.1 Externally funded projects at CFUM ("Projetos Individuais"), ongoing in 2020

Title	Researcher	Funding entity	Start date	End date	Global Budget - UM
WinPSC - Novos avanços tecnológicos para a terceira geração de células solares sensibilizadas com perovskita	Carlos Tavares	ANI	01-01-2017	30-06-2020	193 150,03 €
GNESIS - Graphenest's New Engineered System and its Implementation Solutions	Nuno Peres	ANI	01/08/2018	27/07/2020	413 325,89 €
On-Surf .: Mobilizar competências tecnológicas em Engenharia de Superfcies	Sandra Carvalho/Filipe Vaz	ANI	01-10-2018	30-09-2021	478 235,35 €
Science DiabetICC Fo - Desenvolvimento de calçado terapêutico inovador para pé diabético	Sandra Carvalho	ANI	20/08/2019	30/09/2021	430 948,51 €
ReleaseME- TÊXTEIS INTELIGENTES COM MICROCÁPSULAS FOTOCATALÍTICAS	Carlos Tavares	ANI	01/08/2019	31/07/2022	301 959,33 €
MAG4Biomed - Soluções nanomagnéticas para terapia oncológica	Elisabete Coutinho	ANI	15/04/2019	14/04/2021	12 087,11 €
ORAiDEA: ORAiDEA - Desenvolvimento de implantes dentários multifuncionais	Sandra Carvalho	ANI	01/07/2020	30/06/2023	114 101,17 €
GREENCoat: Green Vacuum Coatings - Metalização Ecológica de Plásticos	Sandra Carvalho	ANI	01/09/2020	31/08/2022	319 819,46 €
i4REV: Desenvolvimento de Revestimentos Nanoestruturados para Funcionalização de Superfícies de Peças Automóveis	Sandra Carvalho	ANI	19/02/2020	18/02/2023	143 524,79 €
4NoPressure -Desenvolvimento de vestuário inteligente para a prevenção da ocorrência de úlceras de pressão	Carlos Tavares	ANI	01/04/2020	01/04/2023	82 999,59 €

MCTool21 .: Manufacturing of cutting tools for the 21st century: from nano-scale material design to numerical process simulation	Luís Silvino Marques	ANI-MIT	01/04/2020	31/03/2023	258 535,27 €
NanoStim .: NanoStim - Nanomaterials for wearable-based integrated biostimulation	Filipe Vaz	ANI-MIT	01/04/2020	01/04/2023	252 003,39 €
GEMIS: Graphene-enhanced Electro-Magnetic interference Shielding	Nuno Peres	ANI-MIT	01/06/2020	31/05/2024	250 004,41 €
	Nuno Peres	CE	01/04/2018	31/03/2020	250 129,78 €
INDESMO - FInternational Network on Ionic Liquid Deep Eutectic Solvent Based Metal Organic Frameworks Mixed Matrix Membranes.	Carlos Costa	CE	01/03/2018	28/02/2022	166 500,00 €
GrapheneCore3 - 881603	Nuno Peres	CE	01/04/2020	31/03/2022	202 400,00 €
FROM LITERACY TO DIGITAL AND TECHNOLOGICAL TRAINING: INNOVATIVE AND CUSTOMIZABLE TRAINING ITINERARY TO FACILITATE EMPLOYABILITY AND INCLUSION OF ADULT PERSONS	Mário Almeida/Senen Lanceros Mendez	ERASMUS	01/09/2019	31/08/2021	13 382,00 €
ClusterStent - Bimetallic clusters for controlled antimicrobial activity on stents	Sandra Carvalho	FCT	01-07-2016	31-01-2020	100 895,00 €
ALD4MAX - Atomic Layer Deposition For tailored bottom-top growth of MAX and MXene films	Diego Martinez	FCT	01-09-2017	31-08-2021	105 000,00 €
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	31/05/2021	75 206,25 €
DEMON - Defect Engineering in rare-earth nickelate thin films towards active magnetic and optical metamaterials	Bernardo Almeida	FCT	01/07/2018	30/06/2021	46 012,50 €
TO CHAIR: The Optimal Challenges in Irrigation	Sofia Lopes	FCT	01/06/2018	31/05/2021	168 785,31 €
GRAPHSENS .:Mid- and far-infrared plasmonic biosensing with graphene	Nuno Peres	FCT	01/07/2018	30/06/2021	78 211,01 €
NLINOP2DMAT: Non Linear Optical Properties of Layered Materials	Nuno Peres	FCT	15/07/2018	14/07/2021	27 000,62 €

MAGLIDUO - MAGnetoLIposomes for DUal cancer therapy	Paulo Coutinho	FCT	01/07/2018	30/06/2021	158 483,17 €
HEALTHYDENT - Design of new antimicrobial osseointegrated dental implants	Sandra Carvalho	FCT	26/07/2018	25/07/2021	193 420,63 €
NANOXYPACK - Nano-sized oxygen scavenger for new active food packaging	Sebastian Calderon	FCT	01/07/2018	30/06/2021	195 008,16 €
LensUM - In vivo biometric and optical changes of the crystalline lens with accommodation and its impact in subjective retina image quality	Sandra Franco	FCT	01/07/2018	30/06/2021	184 658,12 €
MusclEng: Development of advanced strategies and solutions for muscle tissue engineering based on electromechanical microenvironments	Clarisse Ribeiro	FCT	01/07/2018	30/06/2021	220 458,12 €
CONCERT –Silk-coated honeycomb nanocarriers for cancer therapy	Marlene Lúcio	FCT	01/07/2018	30/06/2021	238 120,65 €
ODe2D - Towards high speed optical devices by exploiting the unique electronic properties of engineered 2D materials	Michael Scott Belsley	FCT	01/07/2018	30/06/2021	234 301,87 €
PORTGRAPHE: Control of Port and Douro Wines authenticity using graphene DNA sensors	Bernardo Almeida	FCT	10/08/2018	09/08/2021	55 543,45 €
DNANO4BIO - Development of a nanoplasmonic sensing system for detection of mycotoxins in wine	Filipe Vaz	FCT	01/07/2018	30/06/2021	117 558,20 €
PORTGRAPHE: Control of Port and Douro Wines authenticity using graphene DNA sensors	João Pedro Alpuim	FCT	15/06/2018	14/06/2021	43 712,50 €
ON4SupremeSens: Optical Nanorulers for Super Resolution Microscopy & Sensing	João Pedro Alpuim	FCT	01/06/2018	31/05/2021	31 737,50 €
MicroTreat - Biomimetic microenvironment for the study and development of targeted therapies in hematological malignancies	Vanessa Cardoso	FCT	01/07/2018	30/06/2021	218 603,00 €
E-print .: Advanced Green Printed Batteries for Portable Devices	Carlos Costa	FCT	01/10/2017	30/09/2021	210 158,12 €
Controllub - Self-lubricant coatings for high temperature application with controlled release of the lubricious agent.	Luís Silvino Marques	FCT	01/11/2018	30/06/2020	35 000,00 €

SATRAP .: Rational design of Self-Assembling networks for TRansparent electrode Applications	Marta Ramos/Luis Silvino	FCT	01/10/2017	30/09/2021	164 707,40 €
2DMS - Two dimensional magnetic semiconductors	Bernardo Almeida	FCT	01/09/2018	31/08/2020	24 076,00 €
BORN - Unconventional Thermoelectrics Based on Self-Organized Binary Nanocrystal Superlatices	Marta Ramos/Luis Silvino	FCT	01/11/2018	30/04/2020	48 923,00 €
ESC4SHI .: Efficient Simulation and Computation for Health, Sea and Industry	Stéphane Louis Clain	FCT	14/12/2018	13/12/2021	154 045,62 €
GEO-SR: Multidisciplinary approach to alteration, alterability and conservation of Soares dos Reis' geomaterial sculpture: breaking boundaries in museum paradigmas and creating value in changing societies thr	Mário Pereira	FCT	01/06/2018	31/05/2021	37 500,00 €
Melhoria de revestimentos à base de carbono com baixa taxa de eletrões secundários	Fátima Cerqueira	FCT	01/07/2020	30/06/2022	4 750,00 €
Filmes finos de VO2 dopados com W com nanoarquitecturas 3D do tipo Janus para vidros funcionais energeticamente eficientes	Filipe Vaz	FCT - Bilateral	01/01/2019	31/12/2020	3 000,00 €
Desenvolvimento de heteroestruturas ferroelétrico-semicondutor com nanopartículas plasmónicas embutidas para células solares de elevada eficiência	José Pedro Bastos	FCT - Bilateral	01/01/2019	31/12/2020	3 000,00 €
Tailoring multifunctional nano-filters for waste water remediation	Magarida Fernandes	FCT - Bilateral	01/01/2020	31/12/2021	4 000,00 €
SURFPROTEC - Programa de Doutoramento Nacional em Engenharia e Proteção de Superfícies	Sandra Carvalho	Norte 2020	01/09/2015	31/01/2021	317 250,00 €
Physics Center of Minho and Porto Universities	Luís Rebouta	PE	01/01/2020	31/12/2023	1 052 616,28 €
Physics Center of Minho and Porto Universities	Luís Rebouta	PE	01/01/2020	31/12/2023	496 616,96 €
Bosch - Sensible Car, subprojects P05 / P11	Mikhail Vasilevskiy / Luís Rebouta	ANI-Bosch	01/07/2018	30/06/2021	966 000,00 €
Bosch - Factory of the Future	Eduardo Pereira	ANI-Bosch	01/07/2018	31/12/2021	450 569,44 €

7.2 Key Words by Research Line

7.2.1 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

7.2.2 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	

7.2.3 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	