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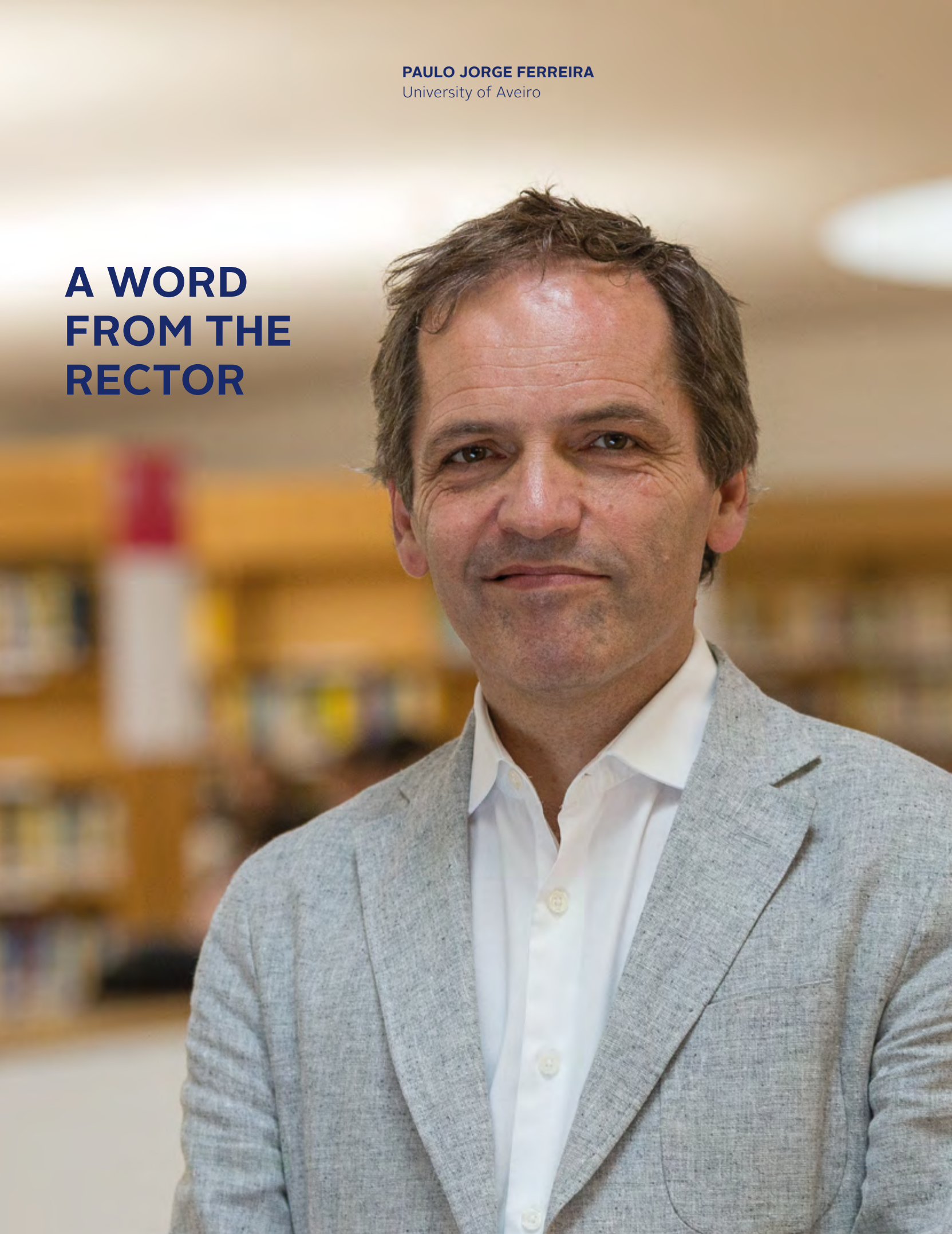
PAULO JORGE FERREIRA
University of Aveiro

A WORD FROM THE RECTOR



"Looking for ways to generate energy without compromising the quality of life of the next generations is one of the important challenges faced by today's global society. The future will be based on economic models that respect a rational balance between energy production and sustainable development and guarantee access to reliable and environmentally friendly energy sources.

The Energy area is therefore a priority for the University of Aveiro, both in terms of education and research. As an area of utmost importance for Humanity and one of the 17 UN Sustainable Development Objectives, it is a highly interdisciplinary and cross-cutting area of study that enables collaboration between the various Departments and Research Units of the University and the interaction with a wide variety of local, regional and European entities."

ARTUR SILVA
University of Aveiro

MESSAGE FROM THE VICE-RECTOR

The University of Aveiro is a research-oriented university, strongly committed to developing cutting-edge research in strategic areas of knowledge, recognizing the implications of its operations and engaging on efforts for a sustainable development. In 2018, the whole community took part in several initiatives that will impact on the future of the university, as well as on the development and implementation of different measures imposed by changes in national research policies. The orientation to hire and retain highly qualified human resources and the high number of approved projects marked positively the year 2018.

The year was marked by the strong involvement with the Coordination of the Research Units and Associated Laboratories, in the process of preparing the proposals submitted under the evaluation process 2017/2018, promoted by the National Foundation for Science and Technology (FCT). To this respect, new research units were approved by the UA General Council, namely a pole of the William James Center for Research, through the integration of some members currently in CINTESIS and CESAM, the Digimedia, composed of the members affiliated to the CIC-Digital, and the pole of REQUIMTE-LAQV, constituted by the majority of the members of the existing QOPNA.

Some major projects approved or started in 2018 illustrate the high-level research developed at our campi. The InPaCTus – Innovative Products and Technologies from Eucalyptus Project, demonstrates the strong link between UA and The Navigator Company, together with RAIZ and the University of Coimbra. Another important project was MEDISIS: Promoting the involvement of key actors in the Central Region for the transfer of knowledge and creation of new partnerships in the areas of Systems Medicine, Regenerative Medicine and Precision Medicine, whose main objectives are to promote the involvement of key actors of the region, identify R&D needs across multiple value chains and to transfer knowledge to these actors and to society in general. Also very important was the approval of MICROBONE – Novel 3D platforms to engineer bone microtissues for in vitro disease models, aiming at the validation and commercial exploitation of a platform based on hydrogels combining biomaterials of human origin and cells, such as disease models, in particular osteosarcoma. Coordinated by UA, the NanoTBTech- Nanoparticles-based 2D thermal bioimaging technologies aims at developing a 2D thermal bioimaging technology with submicroscopic resolution, based on nanotermometers and heater-thermometer nanostructures.

Following the outstanding number of UA applications to the 2017 FCT call for projects in all Scientific Domains, and involving funding from FCT, COMPETE 2020 and regional operational programmes, 141 projects were approved with UA as proponent and 68 as partner institution, representing success rates of 36% and 60%, respectively, and 42% overall. Adding to the human resources hired within these projects, and in order to comply with the implementation of article 23, of Decree-Law no. 57/2016, of August 31, the University published by August 31 three calls for a total of 203 positions, of which 25 to be financed by the University itself. Following the proposal to the FCT Institutional Call for Scientific Employment, the results were known in August 2018, with the allocation of funding for 20 positions distributed between teaching and research careers. Later on, the results of the FCT Individual Scientific Employment Call were also published, where UA obtained a result of 56 approved applications.

In addition to the orientation to hire and retain highly qualified human resources in-house, the University opened two positions for permanent researchers and established strong partnerships within the call for Collaborative Laboratories (CoLAB) with the main objective of creating, directly and indirectly, more qualified employment and scientific employment through the implementation of research and development agendas. 5 proposals were approved, adding to the participation in CoLAB ForestWISE (UA joined in early 2018).

UA has kept on its track and keeps working towards a more innovative and internationally recognized institution. Our robust, multi-disciplinary and collaborative research approach has driven innovation and delivers significant economic, social and environmental benefits for society, daring to embrace challenges as the need for novel environmentally friendly sources of energy while working more intensively to promote the protection of the physical and natural environment, developing new approaches to sustainable development. On the one hand, research should answer the most pressing needs of our local communities and environment, while the other hand, it should also change the wider world, by making a difference in varied fields such as health, information and communication technologies, energy, environment, materials, culture, literature, sustainability and so many other research fields impacting society in general and contributing to a stronger and united European Research Area. This year the research summit event will consider Energy and Sustainability as the main theme!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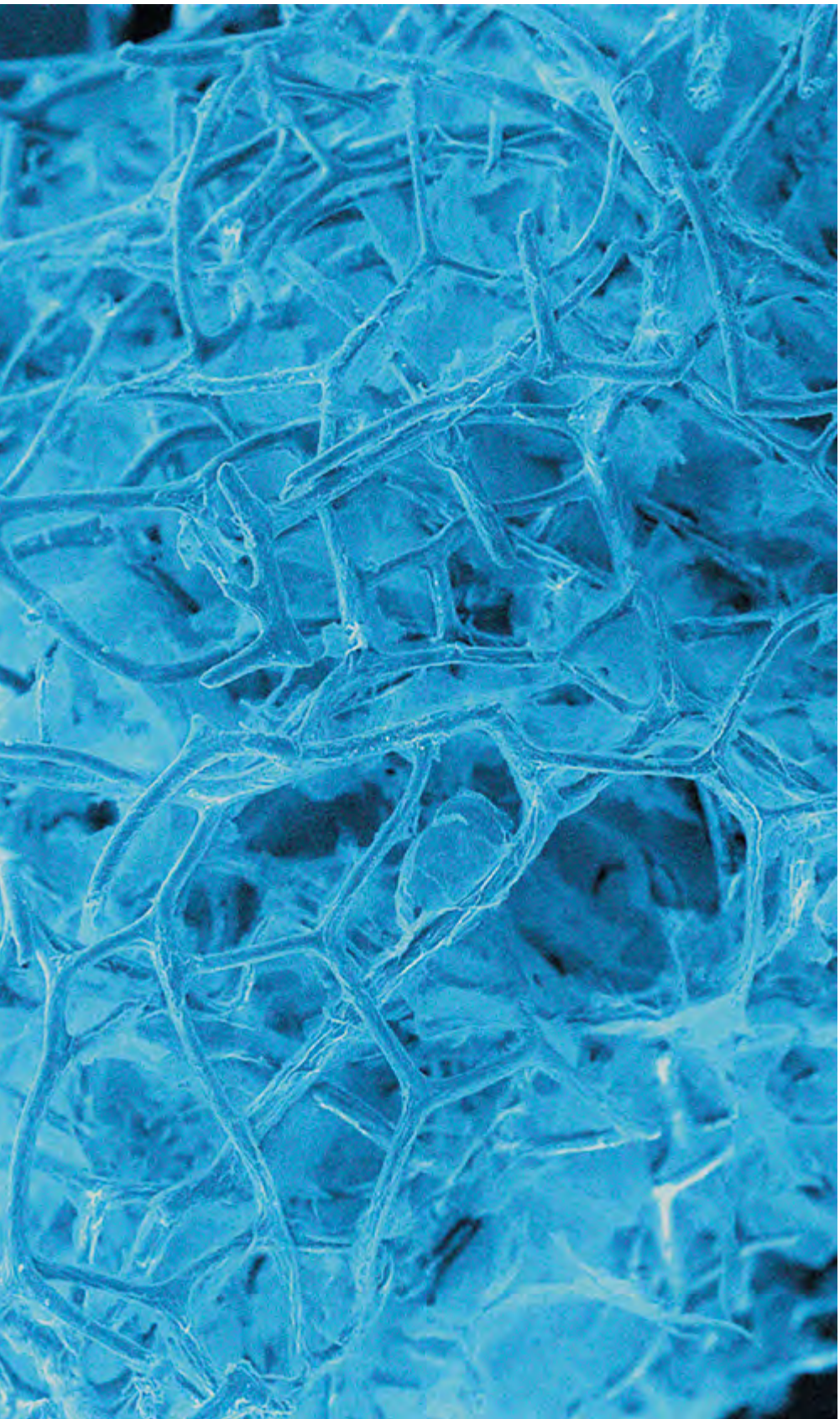
RESEARCH UNIVERSE

Interdisciplinary research centres and facilities

Over the last years, the capacity-building effort in terms of infrastructure (buildings and scientific equipment) and lines of research, including human resources, has been essential to improve UA competitiveness and thus ensure a better future and a greater and more effective contribution to regional development.

The UA research matrix character is the basis of an interdisciplinary and transdisciplinary research, based on the sharing of experiences, the exchange of information, the improvement of practices and the promotion of joint projects among researchers from the different scientific areas at the campi. This integrated structure enables the articulation and harmonization of teaching and research environments, as well as the association with innovative science outreach activities.

Research centres



CESAM
Centre for Environmental and Marine Studies

CESAM's interdisciplinary expertise on environmental and marine sciences enables an active contribution to science-based knowledge supporting socio-ecological systems sustainable management and smart specialization.

Unit coordinator: Ana Lillebø

Research areas: Atmospheric Processes and Modelling, Environment Processes and Pollutants, Functional Biodiversity, Ecotoxicology, Stress Biology, Adaptation Biology and Ecological Processes, Marine and Estuarine Ecology, Oceanography and Marine Geology, Coastal Zone Planning and Management.

http://www.cesam.ua.pt

CIC.DIGITAL
Center for Research in Communication, Information and Digital Culture

Interdisciplinary research centre focusing on innovation in the design of new interaction approaches for human-centered digital media applications.

Pole coordinator: Fernando Ramos

Research areas: Media and Technology, Society, Culture and Arts, Information and Communication.

http://www.cicdigital.org

CICECO
Aveiro Institute of Materials

Its mission is to develop the scientific and technological knowledge necessary for the innovative production and transformation of materials for a sustainable development and the benefit of society (from ceramics to soft matter and hybrids).

Unit coordinator: João Rocha

Research areas: Inorganic Functional Nanomaterials and Organic-Inorganic Hybrids, Multifunctional Ferroic Ceramics and Nanostructures, Materials for Energy and Functional Surfaces, Biorefineries, Biobased Materials and Recycling, Biomedical and Biomimetic Materials and Computer Simulation and Multiscale Modeling.

http://www.ciceco.ua.pt

CIDTFF
Research Centre on Didactics and Technology in the Education of Trainers

Founded in 1994, CIDTFF has a mission anchored in the responsibility of research in education: to contribute to educated, qualified and critical citizens.

Unit coordinator: Helena Araújo e Sá

Research areas: Education, Multiliteracies and Sustainability, Diversities and Curriculum, Professional and Human Development, Educational Policies, Quality and Evaluation, Multimodal Educational, Resources, Professional and Organizational Practices.

https://www.ua.pt/cidtff

CINTESIS
Center for Health Technology and Services Research

CINTESIS.UA is a multidisciplinary research unit mostly focused on Ageing Issues and Health Care Provision. It includes researchers from the Department of Education and Psychology and Health School.

Pole coordinator: Óscar Ribeiro

Research areas: Clinical & Health Services Research, Ageing & Neurosciences Research, Diagnosis, Disease & Therapeutics Research and Data & Methods Research.

http://www.cintesis.eu

CIDMA
Center for Research and Development in Mathematics and Applications

CIDMA is a R&D unit hosted at DMat-UA with the main goal of carrying out fundamental and applied research in Mathematics and to prepare new researchers through post-graduate and advanced education.

Unit coordinator: Delfim Torres

Research areas: Algebra and Geometry, Complex and Hypercomplex Analysis, Functional Analysis and Applications, Gravitational Geometry and Dynamics, History of Mathematics, Optimization, Graph Theory and Combinatorics, Probability and Statistics and Systems and Control.

http://cidma.ua.pt

CLLC
Centre for Languages, Literatures and Cultures

The Centre for Languages, Literatures and Cultures, based in the Department of Languages and Cultures, is an intercultural research unit in the Humanities, with a strong inter and transdisciplinary orientation.

Unit coordinator: Maria Teresa Cortez

Research areas: Between Texts – Literary Hermeneutics; Between Cultural – Cultural Hermeneutics; Between Languages – Variation, Translation, Learning.

https://www.ua.pt/cllc

CIPES
Center for Research in Higher Education Policies

CIPES's mission is to engage in scholarly research in order to advance critical thought and promote informed understanding about the vital policy issues confronting higher education at both the national and international arenas.

Pole coordinator: Teresa Carvalho

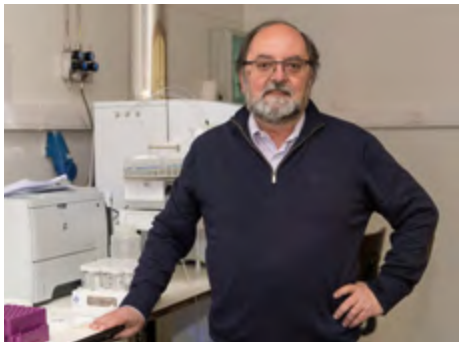
Research areas: Higher Education, System Level Policies, Institutional and Organisational Analysis and Resources, Performance and Human Capital.

http://www.ua.pt/cipes/

GEOBIOTEC
GeoBioSciences, GeoTechnologies and GeoEngineering

Focusing on Geo-Resources/Geo-Environment, Geobiotec works with the most important national mining projects, with skills and resources on industrial minerals, geostatistics, geochemistry, geophysics, mineralogy, medical geology and geomaterials.

Unit coordinator: Fernando Rocha



Research areas: Lithospheric Evolution, Complex Environmental Systems, Georessources, Geotechnics and Geomaterials.

http://www.ua.pt/geo/PageText.aspx?id=17534

IBIMED
Institute of Biomedicine

IBiMED´s mission is to improve life quality and reduce health care costs through advanced biomedical and clinical research focused on personalized medicine and biomarkers of healthy aging.

Unit coordinator: Manuel Santos

Research areas: Human ageing, protein aggregation, epigenome, ageing related diseases, systems biomedicine, clinical studies.

http://www.ua.pt/ibimed

IEETA
Institute of Electronics and Informatics Engineering of Aveiro

IEETA is mainly a Computer Science and Engineering RU, with a strong multidisciplinary character, organized in three groups: Biomedical Informatics and Technologies; Intelligent Robotics and Systems; Information Systems and Processing.

Unit coordinator: Armando Pinho

Research area: Information Processing, Information Systems, Biomedical Informatics, Biomedical Tecnologies, Intelligent Robotics, Intelligent Systems.

www.ieeta.pt

GOVCOPP
Governance, Competitiveness and Public Policies

GOVCOPP's mission is to produce research and knowledge that contribute to economic efficiency and good governance practices in specific territorial contexts, with a particular focus on the Centro region.

Unit coordinator: Anabela Botelho

Research areas: Public Policies, Competitiveness, Local and Regional Innovation Systems, Territory, Development and Tourism.

http://www.ua.pt/govcopp

Research Institute for Design, Media and Culture [ID+]

ID+ is a multidisciplinary R&D consortium that aims to develop, legitimise and communicate design and artistic research and practices in academic, social, cultural and economic contexts.

Unit coordinator: Vasco Branco

Research areas: Design, Art, Media and Culture.

http://www.idmais.org/pt-pt

INET-Md
Institute of Ethnomusicology Research Centre on Music and Dance

INET-Md is a transdisciplinary center that carries out research on music and dance by using current perspectives from ethnomusicology, historical musicology, cultural studies, popular music studies, dance studies, education, performance studies, composition, artistic research, music acoustics and sound studies.

Pole coordinator: Susana Sardo

Research areas: Ethnomusicology and Popular Music Studies, Historical and Cultural Studies in Music, Dance Studies, Creation, Performance and Artistic Research, Education and Music in Community, Musical Acoustics and Sound Studies.

http://www.inetmd.pt

IT
Instituto de Telecomunicações

Instituto de Telecomunicações (IT) is a research unit that is in the front line fostering (nurturing) new ideas and emerging technologies for increasingly agile and easy ways to access ubiquitous information.

Pole coordinator: José Neves

Research areas: Wireless Communications, Optical Communications, Networks and Multimedia and Basic Sciences and Enabling Technologies.

https://www.it.pt

QOPNA
Organic Chemistry, Natural Products and Agro-food Stuffs

Founded in 1992, its mission consists in the development of scientific and technological knowledge for the discovery, preparation, transformation, structural and functional characterization and valorization of functional molecules and materials in a sustainable way.

Unit coordinator: Francisco Amado

Research areas: Organic Chemistry, Natural Products, Food Science, Biochemistry and Mass Spectometry.

https://www.ua.pt/qopna

TEMA
Centre for Mechanical Technology and Automation

TEMA follows the natural evolution of the mechanical engineering for the future, developing research on two mobilizing domains: sustainable manufacturing solutions and technologies for the wellbeing.

Unit coordinator: António Bastos

Research areas: Advanced Mechanical Engineering and Fracture Mechanics, Applied Energy, Biomechanics, Nanoengineering, Transportation Technology and Simulation Software Research and Development.

https://www.ua.pt/tema

I3N – FSCOSD
Institute for Nanostructures, Nanomodelling and Nanofabrication – Physics of Semicondutors, Optoelectronics and Disordered Systems

The i3N/Aveiro develops top quality science and innovation in advanced micro/nano materials and nanotechnologies, and exploits, supported by computer modelling, their multi-functionalities integration in (opto)electronics and photonics devices and systems.

Pole coordinator: João Veloso

Research areas: Modelling of materials behaviour, Nanofabrication and micro-technologies and exploit of their multi-functionalities, Physical characterization of self-assembled nanostructures, Development of (opto)electronics and photonics devices and systems.

https://www.i3n.org

RISCO
Aveiro Research Centre of Risks and Sustainability in Construction

RISCO aims to promote the development of sustainable and resilient cities through safe, environmentally friendly, efficient and durable constructions, and through built heritage conservation.

Unit coordinator: Paulo Cachim

Research areas: Mitigation of risks in the built environment, efficiency of the use of resources in the built environment, built heritage conservation.

http://www.ua.pt/risco

Strategic projects

NanoTBTech – Nanoparticles-based 2D thermal bioimaging technologies

3 years; € 3M; 9 Partners

FET Open is one of the most competitive instruments of the Horizon2020 framework program and supports, among others, the early-stages of science and technology research and innovation focused on new ideas towards radically new future technologies. The NanoTBTech project, funded under the above mentioned scheme, is coordinated by UA and involves another 8 partner institutions from different sectors and 5 different countries, namely the Fundacion para la Investigacion Biomedica del Hospital Universitario Ramon Y Cajal and CSIC (Agencia Estatal Consejo Superior de Investigaciones Cientificas), Spain; CNRS (Centre National de la Recherche Scientifique), France; Institut Za Nuklearne Nauke Vinca, Serbia; Instytut Niskich Temperatur I Badan Strukturalnych IM. Wlodzimierza Trzebiatowskiego Polskiej Akademii Nauk, Poland, Universiteit Utrecht, The Netherlands and two SMEs, NANOIMMUNOTECH S, Spain, and BIOSPACE LAB, France.

The main goal of NanoTBTech is to develop a 2-D thermal bioimaging technology with submicroscopic resolution, based on nanotermometers and heater-thermometer nanostructures. The project includes the synthesis and bio-functionalization of non-toxic luminescent nanostructures, operating essentially in the optical window beyond 1000 nm for nanotermometry and nano-heating in vivo.

In addition, to monitor the temperature dependence of luminescent nanostructures, a new imaging system, to be implemented in two relevant biomedical applications, will be developed: spatially modulated intracellular magnetic / optical hyperthermia and in vivo detection, screening and tracking of cancer. It is expected that, in the long-term, this technology will have a broad impact on non-invasive clinical imaging and theranostics. For instance, the accurate measurement of temperature gradients´ sources will be an invaluable tool for real-time control of thermal therapies, thus making them harmless for the patient. Multiple conceptual breakthroughs can be further envisaged from the proposed 2D-thermal imaging system, credibly spreading its impact towards non-biomedical technological areas.

http://www.nanotbtech.eu/
https://cordis.europa.eu/project/rcn/216329/factsheet/en

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 801305.

MEDISIS : Promoting the involvement of key actors in the Central Region for the transfer of knowledge and creation of new partnerships in the areas of Systems Medicine, Regenerative Medicine and Precision Medicine

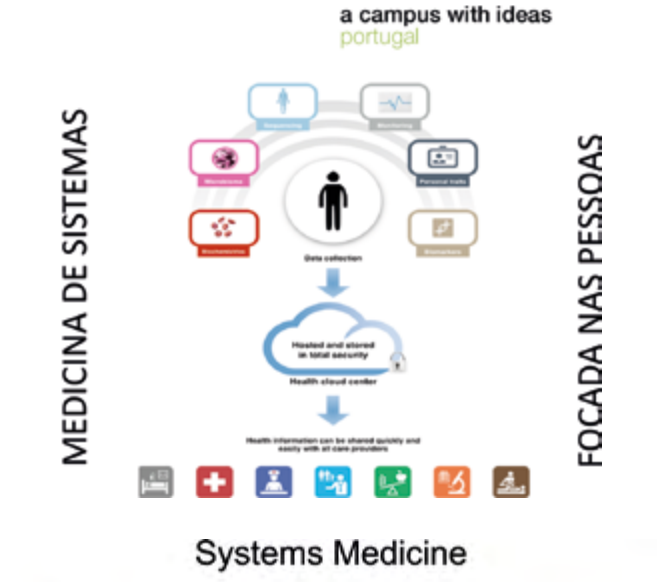
2 years; aprox. € 900 000

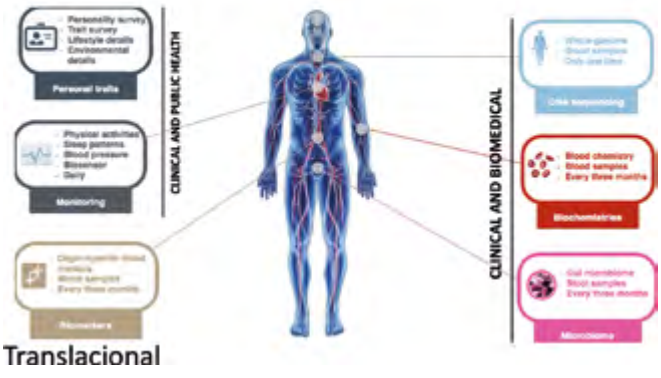
MEDISIS is a 24-month project, funded by Centro Region, whose main objective is to leverage the development of the EU TEAMING project Discoveries CTR: Discoveries Center for Regenerative and Precision Medicine.

UA was chosen by the Discoveries CTR consortium to lead the development of Systems Medicine for cardiovascular, neurodegenerative and musculoskeletal diseases. Systems Medicine focus on the study of human populations with the aim to understand their global health status and take effective actions to detect and correct early signs of disease. It is a data intensive science (BigData) that integrates curated clinical records, disease cohorts, disease biobanks and biomedical data to develop personalized therapies for everyone. MEDISIS is the basis for the development of a new wave of innovation in the health sector focused on Predictive, Preventive, Personalized and Participatory Medicine and it will take advantage of the UA skills in Digital Medicine, BigData Analytics, Clinical and Biomedical Research to mobilize the main players of the health sector.

With the MEDISIS implementation UA intends to identify R&D needs across multiple value chains, to promote the involvement of key actors of the region and transfer the existing knowledge to them and to the society, in general, and to further develop the establishment of strategic partnerships with multiple benefits for UA, Discoveries CTR and its stakeholders, in particular, and for the regional economy and society, in general. The project envisages three major activities to pursue these goals, namely 1) Mapping and raising awareness of the stakeholders of the CENTRO region in the areas of Systems Medicine; 2) Technology Scouting – Mapping and Valorization of R&D results and technologies and 3) Streamlining Participation in National and International Networks.

MEDISIS will create and strengthen the conditions for translational research, contributing for the development of new approaches to detect and correct early signs of disease through personalized and participatory medicine activities and proof of concept actions that will improve quality of life, lower health related costs and foster the relationship with the relevant regional actors, which are necessary for the success of the national Discoveries CTR.





This project has been co-funded by Centro 2020 program, Portugal 2020 and European Union, through the European Regional Development Fund.

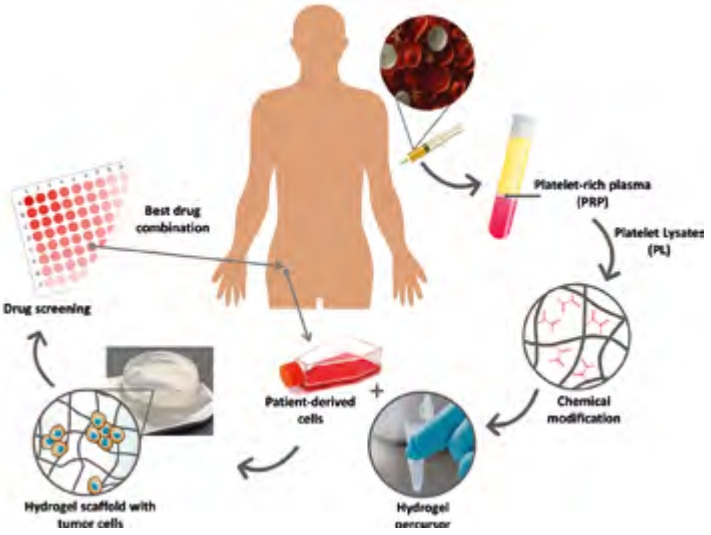
MICROBONE – Novel 3D platforms to engineer bone microtissues for in vitro disease models

17 months; € 150 000

The European Research Council grants, through the funding scheme ERC Proof-of-Concept (ERC-PoC), support activities in the initial stage of transforming results obtained by researchers with previous ERC Grants into applications with commercial potential capable of achieving economic or social benefits. Based on the new knowledge that resulted from the ERC Advanced Grant (ERC-AdG) ATLAS, Professor João F. Mano and his team, from CICECO – Aveiro Institute of Materials and the Department of Chemistry of University of Aveiro, have been working on the validation and commercial exploitation of novel human-derived hydrogels as a platform for tissue engineering applications.

MicroBone is an ERC-PoC funded project focusing on the development of a marketable model to test new treatments for osteosarcoma. Osteosarcoma is a rare but devastating bone tumour very resistant to therapy, that mainly affects children, adolescents and elderly. In vitro tumour models can recapitulate aspects of the native tumour environment and could be used to improve the predictive value of the effect of anticancer drugs, accelerating new therapies development. Therefore, MicroBone aims at the development of relevant 3D disease models that could be used as an enabling tool for personalized and precision drug discovery, increasing our understanding of the mechanisms behind osteosarcoma to test new drug-based therapies.

This prestigious grant is also supporting marketing research, quality assurance implementation, IP strategy and business planning activities of a new spin-off company created at the University of Aveiro in the scope of MicroBone. In parallel, the ATLAS project will continue with more fundamental research in the field of human tissue engineering, in particular the creation of miniaturized "living" devices capable of compartmentalizing cells and advanced biomaterials, suitable for, in a self-regulated way, promoting the formation of new functional tissue (see more recent news from ATLAS in http://compass.web.ua.pt/news_compass/3-years-of-erc-adg-atlas/).



Platelet-lysates obtained from the platelet-rich plasma fraction of the blood of a patient are chemically modified to obtain a biomaterial that can form hydrogels using light. Such hydrogels can be formed with the combination of cells of the patient, providing an adequate 3D environment to produce tumor models where new drugs can be tested. In such approach the best therapeutic solutions could be offered for this particular patient.

https://cordis.europa.eu/project/rcn/213602

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 789760.

InPaCTus – Innovative Products and Technologies from Eucalyptus Project

The InPaCTus – Innovative Products and Technologies from Eucalyptus Project' is a Research & Development Project promoted by THE NAVIGATOR COMPANY, RAIZ, the Universities of Aveiro (UA) and Coimbra (UC) and involving other research and industrial partners. The project is supported by Structural Fund managed by the Portuguese program Portugal 2020.

Inpactus, to be developed by the Consortium, aims to develop new solutions, such as cellulosic pulps with innovative features, new paper products with different specificities and functions, tissue paper with innovative properties, new bioproducts, biofuels and other materials obtained from the deconstruction and conversion of forest biomass and by-products from the pulp industry. This Project responds to challenges in the areas of Pulp, Paper and Tissue business and in the emerging area of Bio-refineries and Bioproducts. This Project aims to become an exemplary success story of University-Company cooperation, through the creation of a true Center of Excellence, multipolar and delocalized, in the area of knowledge and innovation, from eucalyptus.

It is structured in activities that will be developed over a period of 4 years, involving an investment of up to € 14,6 million (including 13.3 M€ investment from European Structural Funds), a global team of the various promoters of around 180 people (including PhD researchers, research fellows, industrial engineers and transversal areas of the company, coordinators, etc...), laboratory equipment, raw materials and consumables, acquisition of consulting services and technical-scientific assistance. The execution of this plan, together with a strategy of valorization and dissemination, will enable companies to enhance direct international sales of pulp, paper and tissue, create synergies with other sectors and end users. The consortium involved in the project will also promote the registration of around 10 patents, the publication of 100 scientific articles, the holding of 50 presentations at conferences and congresses, the creation of 4 spin-offs, the advanced training of researchers and future professionals related to Sector and the creation of 38 highly qualified jobs.

The project will thus bring a set of socio-economic impacts relevant to the national economy, promoting job creation, innovation in products and technologies in a relevant field for the country, valuing endogenous resources and sustainable industrial solutions.

This project has been co-funded by POCI 2020, Portugal 2020 and European Union, through the European Regional Development Fund.

ECIU mobility fund 2018

2018 marked the official launching of the ECIU Mobility Fund. The European Consortium of Innovative Universities (ECIU) recognizes the importance of cooperation in science, technology and innovation for universities to become world-leading research institutions. This scheme is intended to work as an incentive to explore and deepen research collaboration within the ECIU network, for instance, in terms of joint research funding grant applications, scientific publications and research projects. Ultimately it supports professional development of ECIU researchers, by supporting know-how exchange in an international high-quality research environment. Early career researchers are encouraged to apply, including PhD students, but applications from researchers ate any career stage are welcome. The fund is open to all disciplines. Six UA researchers were awarded with this support in 2018:

- Ali Baghizadeh, Department of Materials and Ceramics Engineering & CICECO (@University of Twente)
- Fatemeh Saghezchi, Department of Economics, Management, Industrial Engineering and Tourism & GOVCOPP (@University of Twente)
- Luís Novo , Geociences department & GeoBiotec (@Universitat Autònoma de Barcelona)
- Pegah Mirzadeh, Physics Department & CICECO (@University of Twente)
- Pierre Oskram, Communication and Art Department & ID+ (@Aalborg University)
- Sónia Ventura, Chemistry Department and CICECO (@Tecnológico de Monterrey)

About ECIU

ECIU is an international consortium of research intensive universities that gathers 13 universities linked by a collective emphasis on innovation, creativity and societal impact. Its activities are focused on 7 big themes: science, innovation, entrepreneurship, cooperation, mobility, education and regional development.

ECIU Partner Universities : Aalborg University, Dublin City University, Hamburg University of Technology, Kaunas University of Technology, Linköping University, Tampere University of Technology, Tecnológico de Monterrey, The University of Nottingham, Universitat Autònoma de Barcelona, University of Aveiro, University of Stavanger, University of Trento; University of Twente.

AWARDEES TESTIMONIALS

Luís Novo
Geociences department & GeoBiotec (@ Universitat Autònoma de Barcelona, 1 week)

When I first learnt about the ECIU mobility award, I couldn't help thinking "here's a cool way to fund a trip overseas and hopefully set in motion a new partnership". Surely, I was not wrong, but it was also so much more than that.

The application process itself was quite straightforward. There was no red tape involved and the results turnaround time was incredibly fast – I was notified only three weeks after submission! After a warm welcome by my hosts from the Ecological and Forestry Applications Research Centre at the Autonomous University of Barcelona, I was immediately immersed in several activities that had been carefully planned ahead of my arrival. The numerous field trips, group meetings, and seminars, certainly helped us aligning our interests, resources, and capabilities, taking the collaboration further than original expected. We are now actively involved in two different projects and pursuing new opportunities through joint applications to major research funding schemes. Since my visit, we have been in constant touch to keep track of ongoing experiments, discuss results, and prepare cooperative publications. Moreover, we already have new field measurements in Catalonia lined up, as well as concerted conference presentations. Needless to say, the partnership has also helped nurturing a solid friendship. To sum up, the award has granted me the possibility of working with top-tier scientists from a world-class institution, boosting my professional and personal growth.

Ali Baghizade
Department of Materials and Ceramics Engineering, and CICECO (@University of Twente, 2 months)

My research is focused on epitaxial growth of multiferroic oxide films in collaboration with the Department of Physics, University of Minho, where I was using pulsed laser deposition for film growth. New advancement in the field of oxide superlattice motivated me to consider more sophisticated engineering of multiferroic films with few unit cells thickness. To accomplish this ambition, I had to use facilities allowing in-situ monitoring of film growth with unit cell precision. Within ECIU consortium, I found the University of Twente (Department of Inorganic Chemistry), one of the world leading Universities in developing pulsed laser technique.

While I there, I got training on their available facilities to conduct my research. Also I had opportunity to attend weekly social and scientific events of the Department, and a few days workshop on recent breakthroughs in oxide epitaxy organized by the Department. In the Department and MESA+ Institute, I met many experts from different nationalities, a further opportunity to expand my network. Based on my work within the ECIU grant, currently I am spending 6 months visit in ETH, Zurich, supported by FCT fund, to implement complementary research on samples I produced in University of Twente.

As a closing sentence, I always appreciate the kind support of the ECIU team in University of Aveiro, which without their help, such program and travel visit would be almost impossible.

Pegah Mirzadeh
Physics Department & CICECO (@ University of Twente, 2 weeks)

Being a researcher and working within the community taught me to be open to collaborations and new experiences. However, as a freshly graduated PhD, it is hard to find connections in the community. I came across the announcement for ECIU grant while I had difficulty in my research. Although University of Aveiro provides nice variety of characterization equipment, it is never enough. I applied for the grant after contacting the MESA+ Institute, University of Twente, Netherlands and within few weeks, I had an acceptance from the ECIU committee. The process of application is very fast forward and with the help of ECIU team, it is an easy task.

Only one month after having the acceptance, I traveled to Twente, and got a very warm welcome from the MESA+ Institute members. Professor Hilgenkamp, Dean in Faculty of Science and Technology, was very helpful and on my first day of arrival, he introduced me to his group, who were so kind to stop their research and focused on my work. The results from my two weeks of stay in Netherlands was really helpful and complementary to the data that I had before. Furthermore, I had opportunity to attend weekly social and scientific events in the department and meet experts, which is helping me to extend my connections in my field of work. Finally, I want to show my appreciation for kind support of the ECIU team in University of Aveiro, which without their help, such program and travel visit would have been impossible.

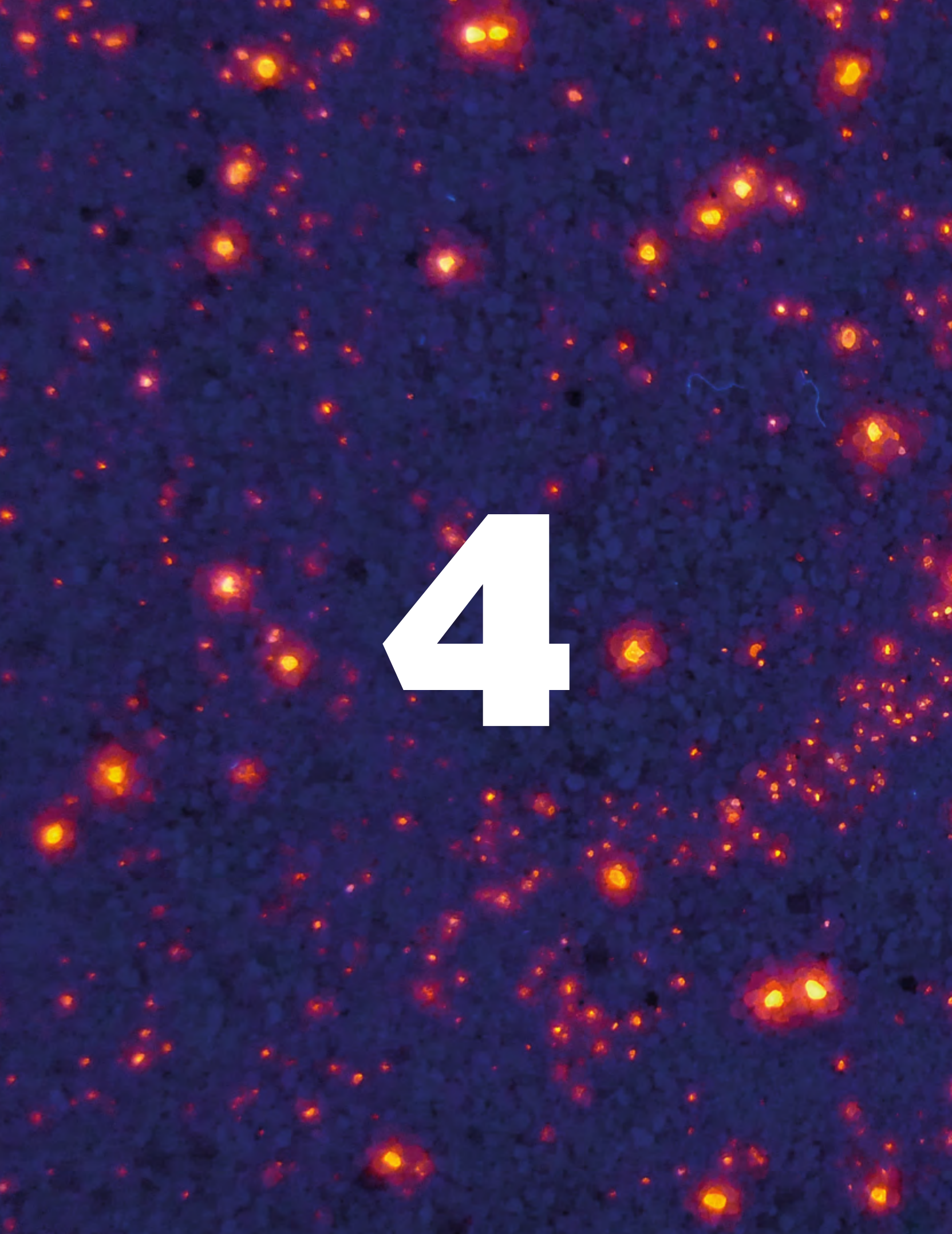
Pierre Oskram
Communication and Art Department & ID+(@Aalborg University, 3 weeks)

The new building "CREATE" at the waterfront stands out. A huge entrance hall with large windows, student livelihood and smell of coffee welcomed me. At the upper floors, the open design studio allowed me to peek at the models and drawings. Head of the department Dr. Lea Laursen friendly welcomed me and showed me the workspace. The common table and kitchen for the whole research department, made it easy for me to mingle. An impression: with Christmas we had a "julefrokost" (Christmas lunch) and we sang a song about the department together. Aalborg itself is a serene place with beautiful old buildings, contrasted with modern technology and sleek buildings popping up. At the same time, nature is very close. I recommend exploring the region as well: discover why the Vikings settled down here. Many Aalborgians like to play board games. We have gone to pubs (yes, there are pubs just for playing board-games) to play – perfect to get to know locals! The absolute cherry on top was when Dr. Lea Laursen drove me through the Northern region of Denmark (Jutland). We had exciting research-related discussions during this trip. Without her knowledge and hospitality, my insights wouldn´t have been this rich. From research insights to cultural experience and personal connection, this initiative was very fruitful to me. I aim to come back again to work together. To conclude I am very grateful for this opportunity!

Fatemeh Saghezchi
Department of Economics, Management, Industrial Engineering and Tourism and GOVCCOPP (@University of Twente, 1,5 month)

My thesis is focused on developing and validating a scale for measuring quality of service experience of visitors in the context of science centres. From October till December 2018, I was a visiting PhD student at NIKOS centre, University of Twente (UT), Netherlands, supported by the ECIU Research Mobility Fund, where I worked with Prof Efthymios Constantinides and Prof Agata Leszkiewicz. This mobility programme provided me a great opportunity for collaboration and working abroad with a wonderful group and in a warm atmosphere. It helped me experience new culture, broaden my skills, and connect to new experts, colleagues, and friends. I acquired not only new insights into my own research, by receiving invaluable feedback from different perspectives, but I also became familiar with other interesting research topics. Overall, it was a great experience, and I am very pleased to have this opportunity. I would like to express my sincere appreciation to the ECIU programme, NIKOS Centre, and the Research Support Office (GAI) (specially, Ms Tatiana Lima Costa and Ms Fabiana Henriques) for their kind support during my stay.

Photo: Erik Brinkhorst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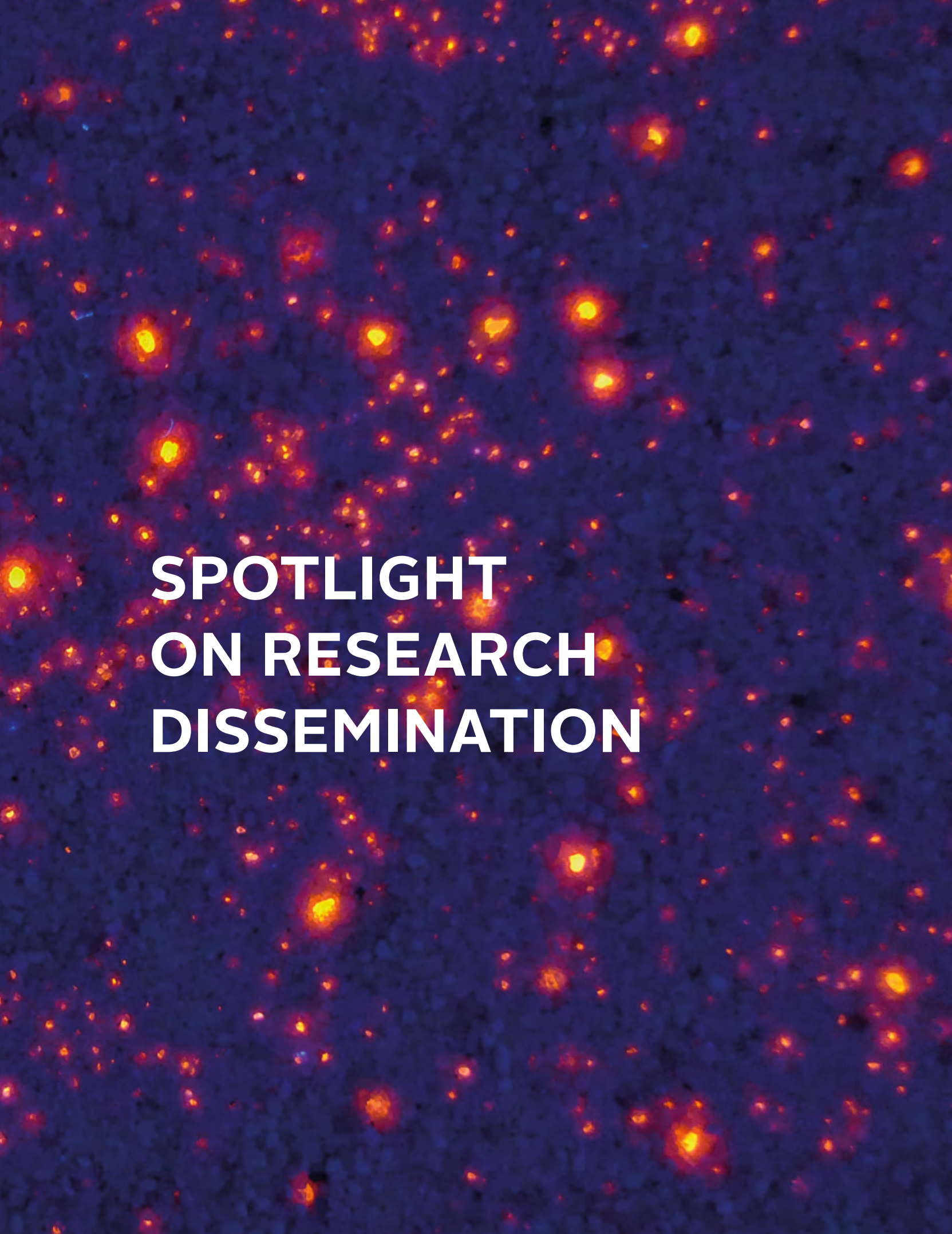

SPOTLIGHT ON RESEARCH DISSEMINATION

Research Summit 2018

"Social Responsibility of Higher Education Institutions & Research" was the theme of the first edition of the Research Summit at the University of Aveiro, held in November 28-29, 2018.

In a world where sustainability is a keyword in many scenarios, it is critical for higher education institutions to maintain a diligent, yet socially responsible, focus on research, innovation and collaboration in order to identify areas of opportunity and to adopt strategies that produce the desired outcomes. The objectives of Research Summit 2018 included the strengthening of the network among the faculty members, researchers and students at the campus, developing sustainable research partnerships, for a more sustainable use of infrastructures, sharing of know-how and contacts, the showcasing of the SR&TD integrated programmes approved by Centro Region, and offering early career researchers the opportunity to pitch their work, so as to improve communication and networking skills.

The programme included 3 keynote talks by highly-reputed speakers. With his presentation entitled "University Social Responsibility – the case of the Spanish Universities", Dr. Óscar González, University of Burgos, Spain, addressed how the Spanish University System implemented University Social Responsibility. The audience learnt how worldwide higher education institutions began to embrace sustainability and involve their campuses and communities in such efforts, leading to the development of integrity and ethical values in HE institutions. The Director of Education at the Aga Khan Foundation in Portugal, Alexandra Marques presented the work entitled "Rethinking the community with a pluralistic outlook: bridging practice and knowledge in an uncertain world" and gave insights of the work developed by AKF, which continuously pursues to bridge practice and knowledge through participation and co-construction processes, giving voice to the most vulnerable communities and individuals. The last keynote, by Dr. Anne C. Deveson, Deputy Editor of the Chemistry-A European Journal and Editor-in-Chief, Chemistry Select, provided the audience with the opportunity to learn about "Publishing, Ethics, and Open Research: An Editor's Perspective".

The Research Summit also hosted scientific round table sessions, where, in an informal setting, coordinators presented the audience with a brief introduction of the issues addressed in their Research Units. The Vice-Rector for Research, Innovation and 3rd Cycle, Professor Artur Silva, moderated, afterwards, a debate on the perspective of these coordinators on the research, impact and social responsibility of higher education institutions.

Day II provided the opportunity for the audience to learn about the 6 strategic projects supported by CENTRO Region, which are potentiating UA's research capacity in pivotal research areas, such as Energy (SusPhotoSolutions – Sustainable Photovoltaic Solutions), Agro-food (Agro-ForWealth – Biorefining of agriculture and forest byproducts), Sea (Smart-BioR – Smart Valorization of Biological and Marine Resources), Health (pAGE – Life-Long Protein Aggregation), IT (SOCA – Smart Open Campus) and Territorial Inno-vation (cENTER – Community-led Net-works for Territorial Innovation). Within this scope, Research Summit also had the privilege to welcome presentations by NOKIA, Instituto Politécnico de Leiria and Instituto Superior Técnico Lisboa University).

Also of relevance in this second day of Research Summit were the 52 PhD students who participated in the PhD pitch contests. The challenge posed to PhD students was to perform a compelling presentation on their thesis. 8 PhD students, one per panel, received a certificate of Best Pitch and a monetary prize to spend on their PhD work.

The winners of PhD Pitch contest in Research Summit 2018 were:

- Margarida Martins/ CICECO – SEA: Sustainability Extracted from Algae;
- Daniela Fonseca/ CICECO – Microneedles: holding the key to pain-free injections;
- Valentina Piacentini/ CIDTFF – Educational approach for learning Science together with English at Portuguese middle school;
- João Dias/ TEMA – Adsorption heat pumps for central and domestic water heating;
- Daniel Pereira/ IT – Quantum RNG based on vacuum noise;
- Marisa Pereira/ Ibimed – Development of a Protein Aggregation Sensor;
- Filipe Moreira/ Digimedia – Internet of Things in Educational contexts: technologies, potentialities, challenges and paradigm shifts;
- Luísa Magalhães/ Cesam – Do trematode parasites matter?.

The Research Summit was attended by graduation and post-graduation students, researchers and professors from the University of Aveiro, which enriched the event with their presence and active contribution.

Academia de Verão

ACADEMIA DE VERÃO – SCIENCE FOR YOUNG PEOPLE

The "Academia de Verão" (Summer Academy) is an initiative organized by the University of Aveiro every July. The Summer Academy is the most intense scientific dissemination activity aimed at pre-university public. Either during one or two weeks, the university provided these young participants the opportunity to explore interesting scientific projects, integrate a handful of projects totally organized by the departments that accepted this annual challenge. It can be enjoyed in a residential model, in which participants are integrated in campus life 24/ 24 hours.

The 2018 edition welcomed 430 participants, aged between ten and nineteen years old, which joined one of the twenty-seven different thematic programs offered by the sixteen departments and schools involved.

The promotion of public understanding of science, the concern in communicating the scientific outreaches to the society and the development of "science to all" initiatives is a strong focus of the UA organizational culture. Since its foundation the UA promoted an open Day, lately transformed in an open Week, dedicated to strengthen the ties between the society and the scientific world and promoting the scientific areas and the different offer of study cycles. The creation of a dedicated structure to communication in the UA, in the mid-90s of the XX century, and the Fábrica – Live Science Centre in 2004 were very innovative and pioneer enterprises in the context of the Portuguese universities. Nowadays, the efforts of these structures are permanent and the commitment was strengthened to the global university community.

The UA concern about science outreach and public engagement with scientific and technological issues is also seen as an opportunity of improvement of the citizenship and welfare of our society. This is an all-year round premise that is also true during Summer Academy. Children and young people are welcome to join and get involved in the scientific and cultural activities, promoted especially for them, during the summer as well as throughout the year.


5

RESEARCH HIGHLIGHTS

Skin infection treatments: the combined effect of photodynamic therapy and antibiotics

Tatiana Branco[1], Nádia Valério[1], Vânia Jesus[1], Adelaide Almeida[1], Cristina J. Dias[2], M. Graça P. M. S. Neves[2], M. Amparo F. Faustino[2]

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2 — Department of Chemistry & QOPNA & LAQV-REQUIMTE University of Aveiro

Bacterial resistance is undoubtedly recognized as a major medical challenge in most healthcare systems. Staphylococcus aureus is a common bacterium that belongs to the natural microflora present on skin surface and on mucous membranes but can become pathogenic in conditions such as breakage of the skin barrier or decreased immunity. S. aureus also tends to accumulate on medical devices, such as heart pacemakers and catheters and the infections are usually treated with antibiotics. However, the hospital-acquired infections by S. aureus have grew dramatically, being accompanied by an increase in antibiotic-resistant strains, particularly methicillin-resistant S. aureus (MRSA) and vancomycin-resistant strains (VRSA), which are collectively recognized as a very serious health threat. Consequently, it is urgent to develop new alternative approaches to conventional antibiotics to deal with bacterial infections. Antimicrobial photodynamic therapy (aPDT) is being considered a very promising alternative with a multi-target action and no emergence of resistances.

Although it is recognized that aPDT is effective to combat bacterial infections, little effort has been made to use the combined effect of aPDT and antibiotics. In this context, it was evaluated how the efficiency of aPDT to treat S. aureus skin infections is affected by the presence of conventional antibiotics. The studies were performed in porcine skin, a good ex-vivo model for human skin, and the treatment was mediated by a cationic photosensitizer (Tetra-Py+-Me) in the pre-sence and in the absence of ampicillin (Figure 1). The results showed that aPDT is an effective approach to control S. aureus infection in skin, inactivating the bacterium efficiently after three successive cycles of treatment or after one cycle by using the combination aPDT and ampicillin (Figure 2).

This work is a milestone in understanding the rationale of the combined effect of aPDT and antibiotics for the treatment of skin bacterial infections, which represents a potential alternative treatment strategy in face of the antibiotic resistance crisis.

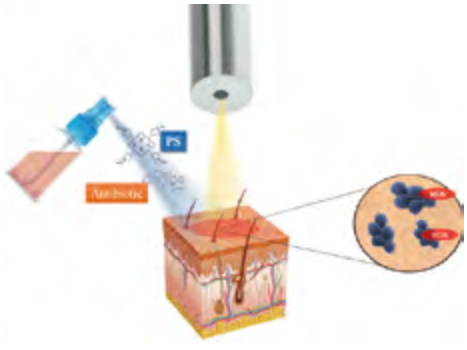

FIGURE 1
Combined action of antimicrobial photodynamic therapy (aPDT) and antibiotics in the inactivation of Staphylococcus aureus.

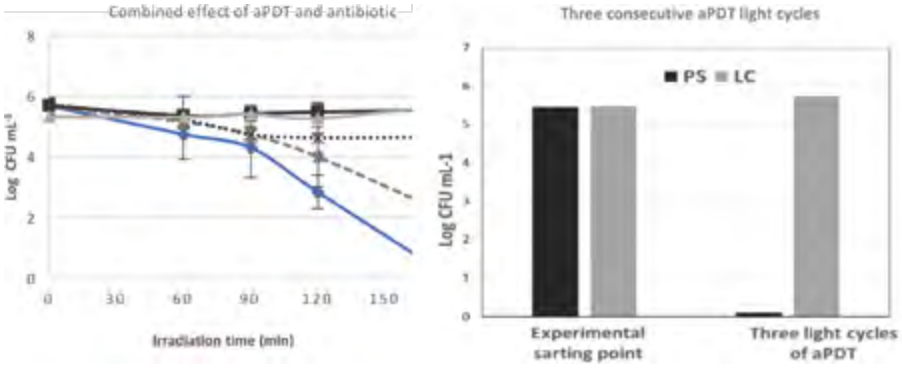

FIGURE 2
Inactivation of S. aureus on porcine skin.

Unravelling transgenerational plasticity on marine invertebrates in a changing ocean

Diana Madeira[1], Maude Boissonneault[2], Aracelli Rodríguez-Romero[3], Fanny Vermandele[2], Ricardo Calado[1], Gloria Massamba N'Siala[2], Piero Calosi[2]

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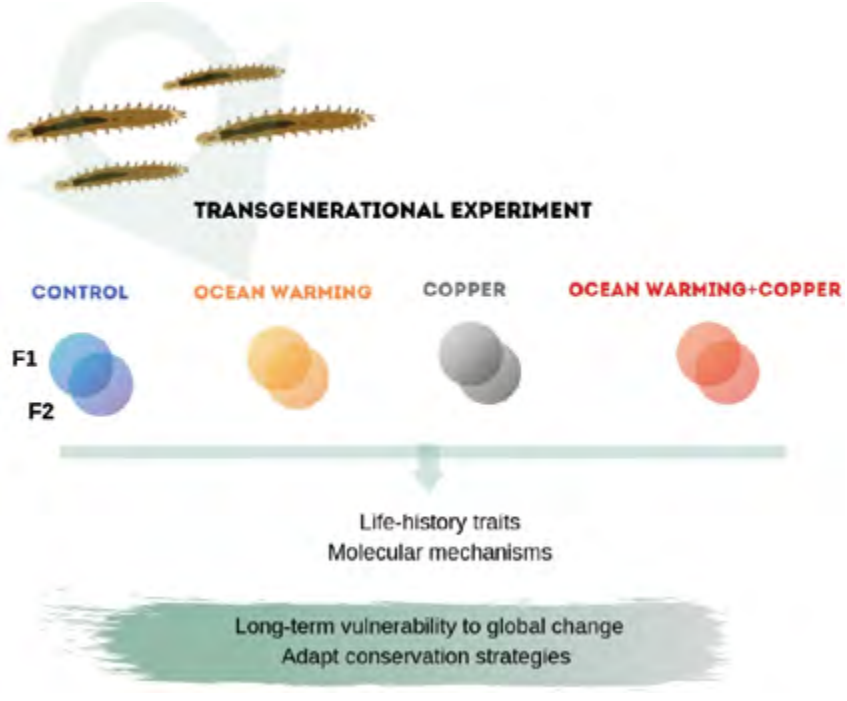
2 — Department of Biology, Chemistry and Geography, University of Quebec at Rimouski, Canada
3 — Department of Chemistry, Process and Resource Engineering, University of Cantabria, Spain

Climate change and pollution are happening concomitantly, especially in coastal areas which are subjected to various human activities. Among pollutants, heavy metals, pesticides and detergents are very concerning not only due to their toxicity but also their persistence in the environment. Such factors are known to affect the metabolism and condition of ectotherms, with downstream effects on growth, reproduction, and mortality. Consequently, both climate change and pollution can induce shifts in biodiversity, species distribution and fitness. To date, most global change studies focus on short-term experiments using a single generation, limiting our understanding of global change impacts in the marine environment. In this study we analyzed the impact of ocean warming and copper pollution in life-history traits and proteome of marine polychaetes over two generations in order to identify the pathways underpinning transgenerational responses and fitness consequences. Marine polychaetes are keystone species in many trophic webs of coastal areas, and are easily reared in captivity. These features make them suitable models for transgenerational studies. If acclimation over multiple generations takes place, populations may be able to survive in changing oceans, as previously shown in laboratory studies using other marine invertebrates as models. Preliminary data indicate an increase in fecundity from F1 to F2 in the warming scenario and an increase in average reproductive body size under copper pollution and the combined scenario (copper pollution and warming). Egg developmental rate also tends to increase in the warming scenario. Molecular analyses are currently under development and we hypothesize that differences in protein networks (related with cytoprotective proteins, anti-oxidant defense, mitochondrial enzymes) may dictate life history responses over the generations, potentially allowing for better performance.



The use of locomotor behaviour in zebrafish to detect effects of neuroactive substances

Inês Domingues[1], Thayres Andrade[2], Ana Sanches[3], Nieja Santos[4], Aline Pic-Taylor[5], Evaldo Espindola[3]

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3 — São Carlos Engineering School, University of São Paulo, Brazil
4 — Department of Biology, University of Aveiro
5 — Institute of Biology, University of Brasília, Brazil

Banisteriopsis caapi and Psychotria viridis are plant species used since ancient times by south American indigenous people to prepare a concoction, Ayahuasca, consumed in shamanic ceremonials due to their psychedelic properties. Recently, in Brazil several religious groups have based their ceremonials on the consumption of this beverage, calling the attention of the scientific community to the possible toxicological risks but also to the potential therapeutic applications of Ayahuasca. Locomotor behavior has been increasingly used in zebrafish (Danio rerio) as an endpoint of neuronal disruption, able to detect effects of neuro-active compounds such as Ayahuasca at relatively lower concentrations when compared to the conventional toxicity parameters used. In collaboration with Brazilian partners, behavioral methodologies using the video tracking system Zebrabox have been developed to unravel the effects and modes of action of Ayahuasca. In a first phase an hypoactive (decreased locomotor activity) effect was observed in zebrafish larvae in accordance to the serotonergic action of the active compounds of the mixture (Andrade et al., 2018). Further refinements in the methodologies are being tested to assess anxiety-like behaviors such as thigmotaxis and erratic swimming.

Behavioral methodologies are also being used by the authors in the assessment of effects of environmental pollutants due to their high sensitivity and ecological relevance given that disturbances on the swimming capacity and social behavior of organisms can be directly linked to the impairment of important physiological functions such as predator-prey interaction, feeding and reproduction. Behavioral disturbances have already been described for several types of pesticides and pharmaceuticals (Sanches et al., 2018; Santos et al., 2018) providing data for a better characterization of the modes of actions of these compounds and ultimately contributing to a more accurate assessment of environmental risk.

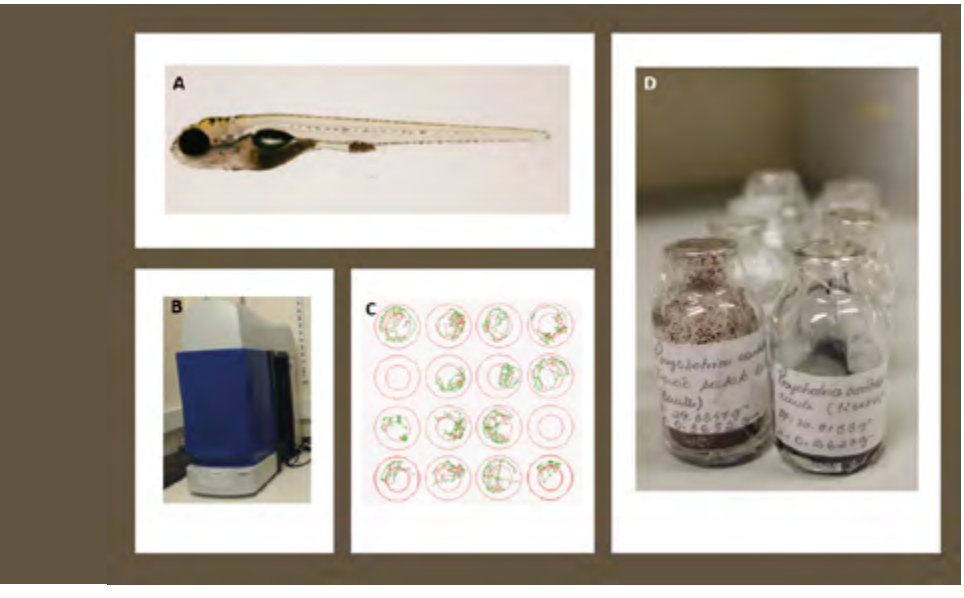


FIGURE 1
A – zebrafish (Danio rerio) larvae;
B – Video tracking equipment Zebrabox;
C – Schematic output of the behavioral analysis of zebrafish larvae;
D – Extracts of plants of the genus Psychotria used in the preparation of the psychoactive beverage Ayahuasca.

AD4TV – Voluntary audio description for Interactive Television (iTV)

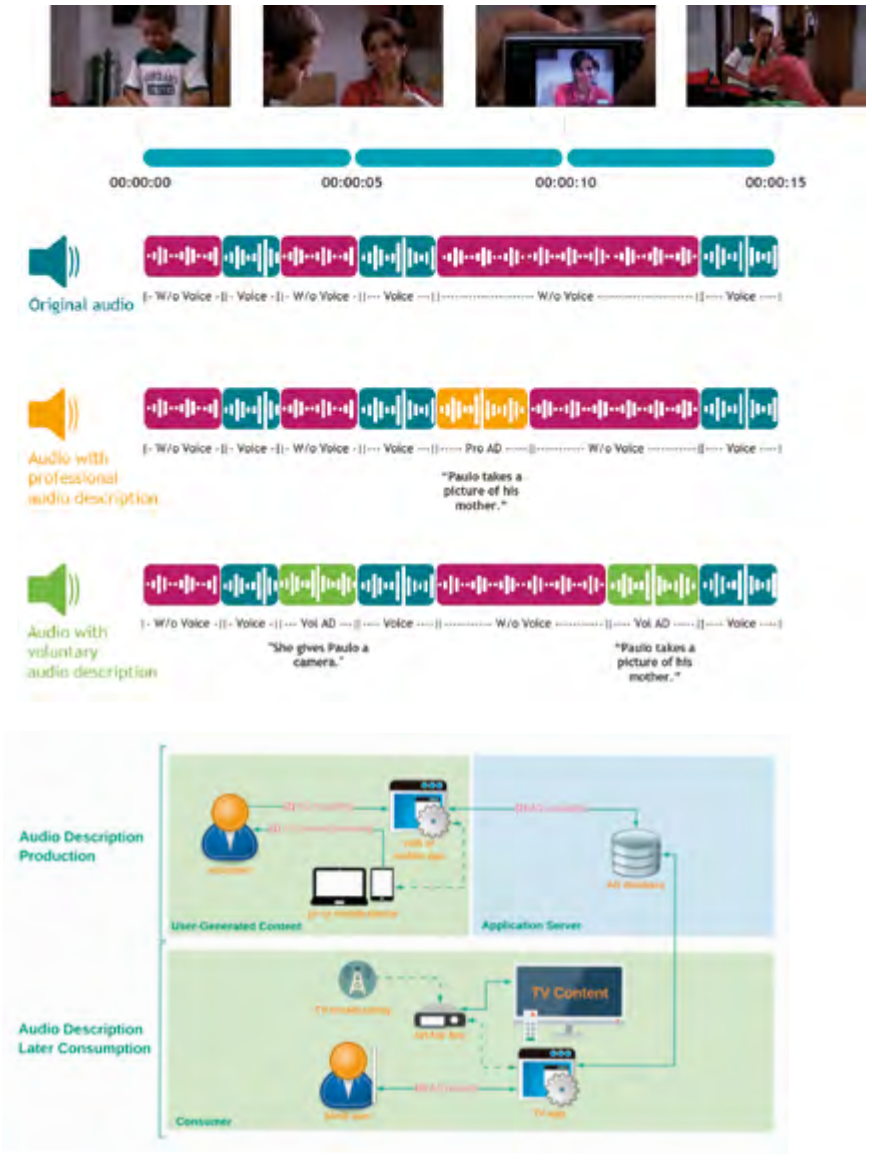
Rita Oliveira[1], Jorge Ferraz de Abreu[1], Ana Margarida Pisco Almeida[1]

1 — Department of Communication and Art & CIC.DIGITAL, University of Aveiro

In a world with increasingly visual activities, it is crucial to promote and implement alternative strategies to allow visually impaired people to access all visual contents with no limitations.

Audio description is a translation technique targeted to visually impaired people, enabling them to fully access and enjoy audio-visual content in a more satisfactory way, namely television programs. Currently, audio description is an expensive process as it is performed by qualified professionals, using specific technical resources. Additionally, the Portuguese offer of accessible TV content is restricted, since citizens with visual impairment can only view few programs with audio description in public TV channels (RTP1 and RTP2). To overcome this problem, the AD4TV system allows volunteers to create audio descriptions using an interface that automatically informs the volunteer of the required segments to audio descript (scenes without dialogues or other audio hints). The volunteer can perform the audio description in a web-based platform and upload the audio file to a repository of audio descriptions. The AD4TV system also includes an Interactive Television (iTV) application so that visually impaired viewers can access, through the television set, the audio descriptions generated by the volunteers. In this way, AD4TV intends to widespread the offer of audio description and it also aims to improve the process of accessing audio description by viewers with visual impairment.

Therefore, this solution can reduce social inequalities by proposing new strategies for the inclusion of people with visual impairment in the Portuguese television panorama.



Pioneering Use of Ionic Liquid-Based Aqueous Biphasic Systems as Membrane--Free Batteries

Paula Navalpotro[1], Catarina M. S. S. Neves[2], Jesus Palma[1], Mara G. Freire[2], João A. P. Coutinho[2], Rebeca Marcilla[1]

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2 — Chemistry Department & CICECO, University of Aveiro

Conventional batteries (Li-ion, Na-ion, NiMH, etc.) have solids as active materials attached to metallic current collectors, usually scarce and expensive. To store large quantities of energy in static systems flow batteries have been proposed, which are based on two fluid phases separated by a membrane. Recently, an innovative concept of membrane-free batteries based on the immiscibility of two redox electrolytes in biphasic systems was proposed, formed by an aqueous and a non-aqueous phase. In this concept, the use of the membrane is redundant due to the immiscibility of electrolytes that are phase-separated by their intrinsic thermodynamic nature, avoiding the use of scarce and expensive metallic active compounds such as vanadium salts. Organic molecules such as quinones, which can be easily prepared at low cost and are environmentally friendly, were used to successfully replace those metallic compounds. In order to improve this concept while avoiding the use of a volatile organic phase, membrane-free batteries based on two aqueous immiscible phases were developed. Aqueous biphasic systems (ABS) formed by water, ionic liquids and salts were proposed as the basis for the creation of aqueous-rich membrane-free batteries. This concept was shown to be feasible due to the selective enrichment of redox organic molecules in each aqueous phase of the ABS. The required separation of electrolytes in the battery is not driven by an expensive membrane that hampers mass transfer, but instead by the intrinsic immiscibility of the two phases. The results gathered show that some redox ABS can be used as Total Aqueous Membrane-Free Batteries with theoretical battery voltages as high as 1.6 V.

FIGURE 1
Scheme of a battery formed by two immisicible aqueous phases.

Sustainable luminescent solar concentrators based on organic-inorganic hybrids modified by chlorophyll

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Luminescent solar concentrators (LSCs) are luminescent waveguides able to convert sunlight into specific wavelengths which is then guided by total internal reflection to a photovoltaic (PV) device located at its edges, facilitating the urban integration of PV elements. The use of sustainable natural-based organic molecules as luminescent species is still a challenge. In this work, a novel chlorophyll-based LSC with emission properties in the red/NIR spectral region is reported. The chlorophyll molecules were extracted from Spirulina maxima, an abundant cyanobacteria, and immobilized in organic-inorganic hybrid matrices. The LSCs were coupled to a Si-based commercial PV device revealing optical and power conversion efficiency values of ~3.70 % and 0.10 %, respectively, illustrating their potential for the development of nature-based LSCs meeting the requirements of reliable, sustainable and competitive energy systems.

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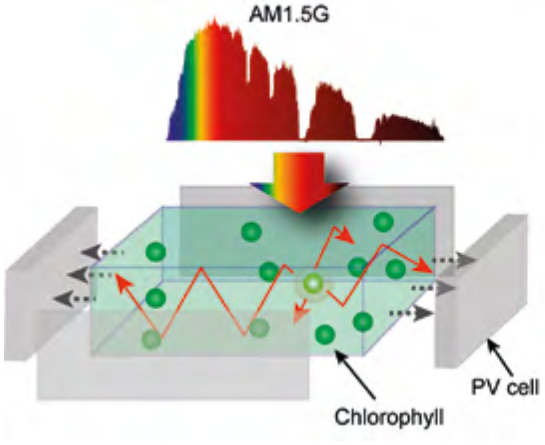

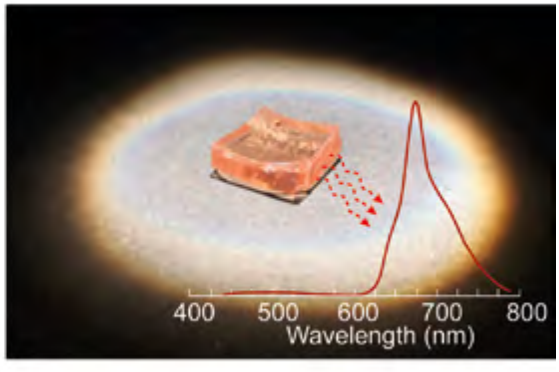

Self-forming nanocomposite concept for ZnO-based thermoelectrics

Kiryl V. Zakharchuk[1], Marc Widenmeyer[2], Denis O. Alikin[3,4], Wenjie Xie[2], Sascha Populoh[5,6], Sergey M. Mikhalev[7], Alexander Tselev[3], Jorge R. Frade[1], Anke Weidenkaff[2,8], Andrei V. Kovalevsky[1]

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7 — Department of Mechanical Engineering & TEMA-NRD, University of Aveiro
8 — Technische Universität Darmstadt, Germany

Thermoelectric (TE) technology allows direct production of electrical energy from waste heat and natural heat sources. Although today TEs are hardly competitive in efficiency with heat engines at the large scale, absence of moving parts, inherent simplicity and scalability of this solid-state technology enable various applications for harsh and remote environments, for solar energy conversion as well as in automotive/aerospace sectors. In these applications, requirements to thermal stability, cost and toxicity may even dominate over efficiency. Zinc oxide (ZnO) is one of TE materials already known for an extraordinary combination of useful electrical, catalytic and photochemical properties. However, coupling between electrical and thermal transport properties restricts improvement of the TE conversion efficiency in the material. The efficiency can be represented as figure-of-merit, $ZT=\sigma x\alpha^2 x\kappa^{-1}$, highlighting the great TE challenge to simultaneously increase the electrical conductivity (σ) and Seebeck coefficient (thermopower, α) while suppressing the thermal conductivity (κ). Independent tuning of the involved material properties is the only way to boost the conversion efficiency.

This work demonstrates a new nanocomposite concept for ZnO-based materials, employing intentional incorporation of the external ZrO_2 nanoparticles (Figure 1, left: bright and red) and in situ formation of a new $ZnAl_2O_4$ nanophase (Figure 1, left: dark and blue), promoted by controlled chemical interactions between the composite components. An interplay between the presence and exsolution of the nanophases and modification of the host ZnO-based matrix leads to an enhanced electrical performance, simultaneously suppressing the thermal transport due to phonon scattering at the interfaces created by the nanoparticles (Figure 1, right). Such decoupling of the electrical and thermal transport is highly promising for implementation in other TE oxide systems.

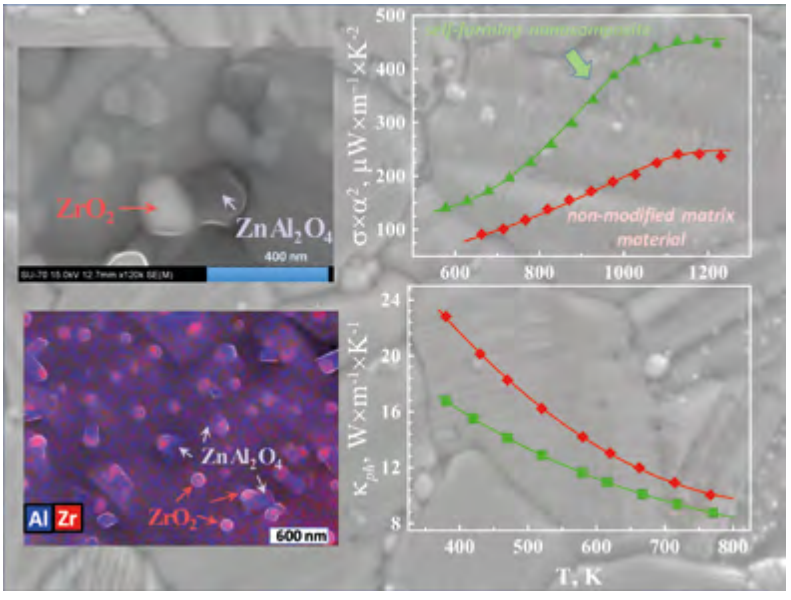

FIGURE 1
Microstructure and chemical composition (left), and electrica $\sigma x\alpha^2$ and thermal (κ) counterparts of the thermoelectric efficiency (right).

Convolutional codes for network coding

D. Napp[1], R. Pinto[1], V. Sidorenko[2]

Coding theory has emerged out of the need for better communication and has rapidly developed as a mathematical theory in strong relationship with algebra and combinatorics. Error correction codes are used in everyday practical applications and have been the foundation of the revolutionary growth in digital communications.

Network coding theory is concerned with the encoding and transmission of information over networks where there may be many information sources and possibly many receivers. The mathematical foundations of random network coding emerged through an award-winning paper by R. Koetter and F. Kschischang in 2008 and it has since then opened a major research area in communication technology with widespread applications for communication networks like the internet, wireless communication systems, and cloud computing. Restriction to the so-called Grassmannian codes has proven to be advantageous and leads to the theory of designs over Galois fields. Network coding allows transmitting information through a network by disregarding any of its topological features. In network coding, algebraic algorithms are applied to the data to achieve better network throughput, reduce delays and make the network more robust.

In this paper we present a novel coding approach to deal with the transmission of information over a network. In particular, we propose to use a rank metric code obtained by concatenation of a Hamming metric outer convolutional code and a rank metric inner block code which encodes each symbol of the outer code separately. We show that the proposed novel scheme improves significantly the transmission of a streaming of information over a network improving the error correction capabilities of the codes, and therefore making the transmission over the network more robust.

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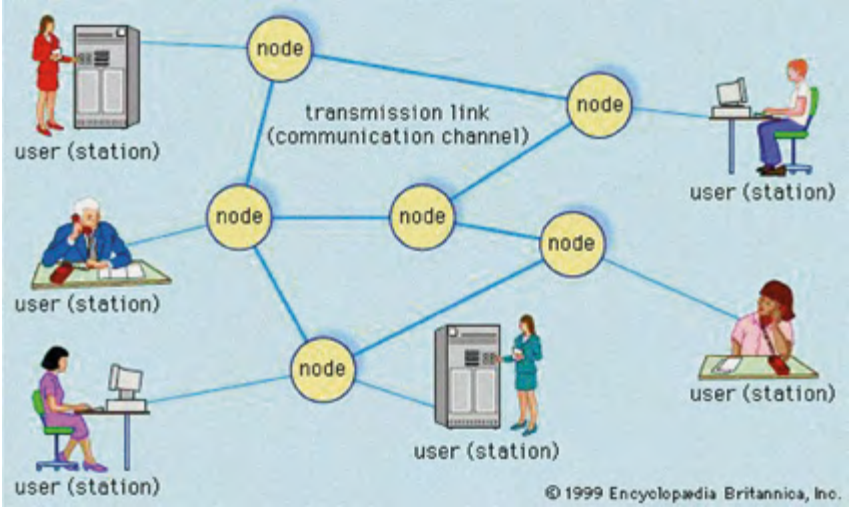
2 — Institute for Communications Engineering, Technical University of Munich, Munich, Germany



Stimulated axion decay in superradiant clouds around primordial black holes

João G. Rosa[1], Thomas W. Kephart[2]

1 — Department of Physics & CIDMA, University of Aveiro
2 — Vanderbilt University, USA

Rotating black holes suffer from the well-known superradiant instability when spinning too fast, and release their excess rotational energy by producing particles in their vicinity.

In this work, we have shown that primordial black holes, born from the gravitational collapse of very overdense regions in the early Universe, can produce dense clouds of axions around them through the superradiant instability. Although these primordial black holes are born with small spin, black hole mergers can lead to highly spinning black holes that suffer from such instabilities. Axions are hypothetical particles predicted in the Peccei-Quinn theory to explain the puzzling smallness of the neutron's electric dipole moment. As a bonus, they are ideal candidates to account for the mysterious dark matter in the Universe. The axion clouds produced around spinning primordial black holes can be so dense that the stimulated decay of the axions into photons can generate a laser-like effect, producing some of the brightest electromagnetic blasts in the cosmos.

For the preferred value of the (yet unknown) axion mass, for which they can account for all of the dark matter in the Universe, such explosions occur at radiofrequencies around 1 GHz, triggered by the superradiant instability of small primordial black holes with around the Earth's mass.

These intense lasers last only for a few milliseconds, since the strong electric field produced within the axion cloud quickly shuts down the process. But in this short period the axion-black hole clouds can shine brighter than a thousand million suns. All these properties are, in fact, in tantalizing agreement with those of the several "fast radio bursts" that have been observed in the past decade.

Our scenario thus offers a common explanation to both dark matter and fast radio bursts, based on new elementary particles that could be detected in the laboratory within the next few years. Dark matter may not be so "dark" after all.

A cholera mathematical model with vaccination and the biggest outbreak of world's history

Ana P. Lemos-Paião[1], Cristiana J. Silva[1], Delfim F. M. Torres[1]

Cholera is an infectious disease that remains a global threat to public health and an indicator of inequity and lack of social development. The number of cholera cases reported by World Health Organization (WHO) has continued to be high over the last few years.

We consider in the worst cholera outbreak that ever occurred in human history, in Yemen, from 27th April 2017 to 15th April 2018. To describe the reality of Yemen, we proposed a mathematical model for the transmission dynamics of some strains of the bacterium Vibrio cholerae, responsible for the cholera disease in humans, which fits this cholera outbreak. The first oral cholera vaccination campaign launched in Yemen occurred on 6th May 2018 and was concluded on 15th May 2018. Simulations of our mathematical model, with and without vaccination, show that the introduction of vaccination from the beginning of the epidemic could have changed the situation in Yemen substantially, to the case where the disease extinguishes naturally (see Figure 1).

The results of our research are supported by the recent cholera outbreak in Mozambique, and the importance of oral cholera vaccination to protect survivors of Cyclone Idai has been stressed by WHO, where more than 900 000 vaccine doses were distributed to the population.

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FIGURE 1
Cholera outbreak in Yemen with and without vaccination.

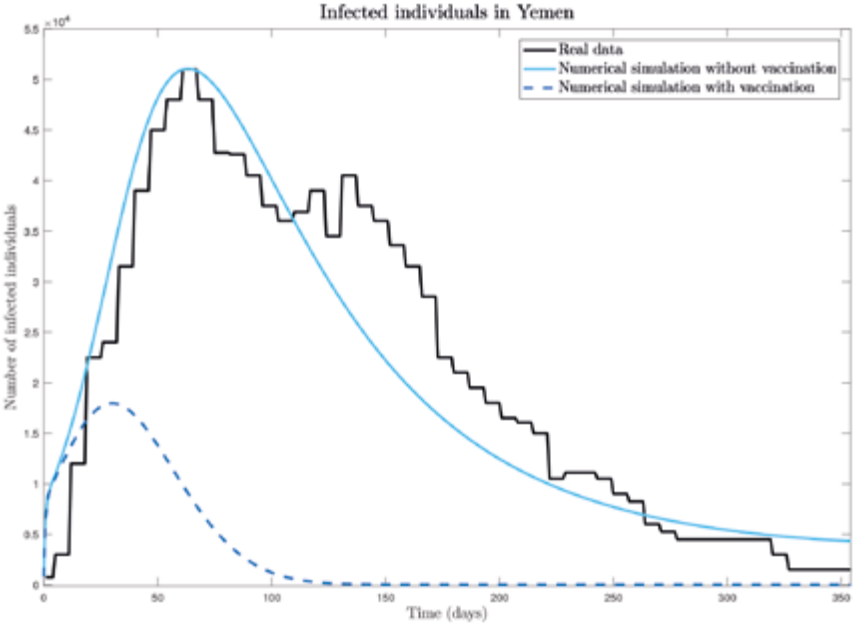

FIGURE 2
Boy in Yemen receives cholera vaccination (source WHO).

EduPARK – changing mentalities about how people learn

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* The project is financed by FEDER (Fundo Europeu de Desenvolvimento Regional) funds, through the COMPETE 2020 – Operational Programme for Competitiveness and Internationalisation (POCI), and by Portuguese funds, through FCT – Fundação para a Ciência e a Tecnologia (POCI-01-0145-FEDER-016542).

The EduPARK* project moves learning from traditional classroom environments to natural spaces that students can physically explore, making connections with curricular contents, in the Aveiro green park. The EduPARK team, comprising researchers from different UA departments (DEP, DBio & DETI), developed a freely available Google app, which everyone can use to learn in an enjoyable and authentic way. It gives access to augmented reality (AR) contents in Portuguese and English, as well as to interactive cross-subjects educational games for students from Basic to Higher Education and for the tourist/public in general. The project, articulating research and training, relies on the combination of mobile devices, games and outdoor environments to promote authentic learning and contributing to change mentalities about how people learn.

The EduPARK project was the winner of the 2018 ECIU Team Award for Innovation in Teaching and Learning. The jury pointed out that the project revealed a particularly high level of innovation through: a) a multidisciplinary team of researchers; b) the educative use of AR in day-to-day technologies, such as the smartphone; and c) the challenging of conventional thought about the way people can learn.

Regular activities are being held (75 so far, involving 1250 students, 280 teachers and hundreds of tourists, including several teacher training sessions), where systematic collection of data takes place to better understand the benefits of mobile learning in outdoor settings. The relevance of EduPARK relies on the enhancement of the educational impact value of urban spaces on schools, the wider community and the tourism sector.

http://edupark.web.ua.pt

Musculoskeletal multisite pain and patterns of association after adjusting for sleep, physical activity, and screen time in adolescents

Anabela G. Silva[1], Pedro Sá Couto[2], Alexandra Queirós[3], Maritza Neto[4], Nelson P. Rocha[5]

Musculoskeletal pain is highly prevalent in adolescents and a strong predictor of pain in adulthood. Young people with musculoskeletal pain tend to report pain at multiple body sites. Nevertheless, it is unclear whether pain at one body site increases the probability of pain at other body sites. Therefore, this study aimed to describe the association between multiple painful body sites after controlling for predictive factors such as age, sex, sleeping hours, time spent in physical activity, and time spent in screening based activities in adolescents aged 13 to 19 years. Pain for the last 3 months, time spent in moderate and vigorous physical activity, sleeping, and in screen-based activities were assessed for 969 students. Of these, 41,2% reported pain in at least 2 body sites. Multivariate regression analysis showed that the association between painful body sites remained significant, after controlling for age, sex, physical activity, sleep and screen time (OR between 1.50 and 3.07, $p < 0.05$). We believe that these findings question the theory of cumulative effects of shared risk factors and highlight the need for preventive and intervention strategies that take a whole-body approach to pain instead of strategies directed at specific body sites.

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Quality management in universities: towards an integrated approach?

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The purpose of our research is to look for empirical evidence of the trend towards the integration of quality management (QM) in universities. We understand integration as the development of QM as part of organisations' global management systems, covering different processes and missions, organisational levels and QM principles.

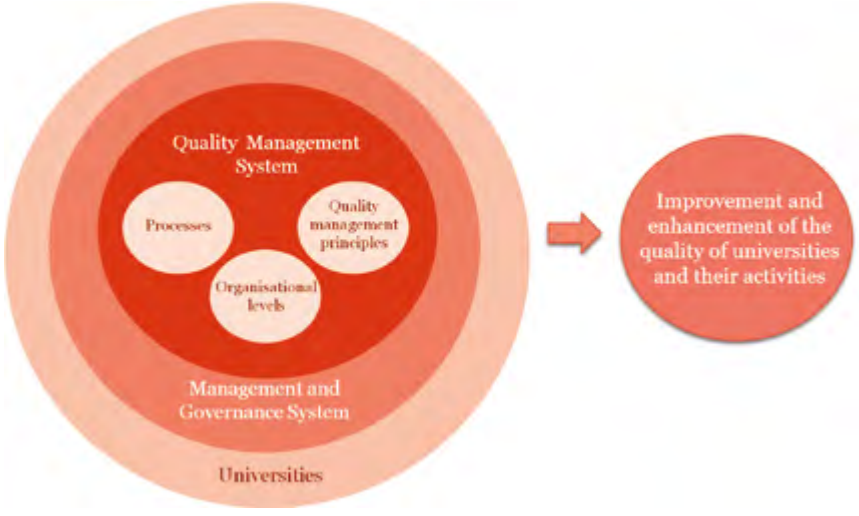
Empirically, the paper is based on a country case study which embeds three paradigmatic university case studies. Data are obtained from institutional documents, as well as from individual and panel interviews with different internal stakeholders.

Globally, universities show signs of integrating QM in their overall management and governance framework. The use of information originating in the QM systems for decision making and the existence of top management representatives in the QM structures are positive factors towards true integration. Still, the very existence of separate bodies dedicated to QM, albeit with people from top management, is an indication of the lack of total integration.

Universities are developing their QM systems with a focus on teaching and learning, but they are increasingly trying to integrate their other missions, namely research and third mission.

With regard to the different organisational levels and units of the universities, while the definition of the QM policies follows a top-down logic, being mostly assured by top management and governance bodies of the institutions, the procedures for the assessment and monitoring of the different processes follow a bottom-up strategy. Nevertheless, if on the one hand, there seems to be an articulation between the different organisational dimensions in the sense that the roles for the different levels are well defined; on the other hand, there is a gap in the communication between different hierarchical levels.

As regards QM principles, universities cover most of them, but seem to fail to: meet their 'customers'' needs and expectations; effectively engage their internal stakeholders; equally integrate their different processes; and fully involve the external stakeholders.



It is simultaneously interesting and surprising to observe how, after so many years of QM in universities and so much research on the topic, universities and their management bodies have not yet been able to embed communication and active stakeholders' participation as key elements of an effective integrated QM system, which contributes to the improvement of the quality of universities and their activities.

The Poetry of Li-Young Lee and Timothy Bewes's Event of Postcolonial Shame

David Callahan[1]

French anthropologist Marc Augé writes: "analysts of modernity have effectively identified two opposing types of myths: myths of origin... and myths of the future, eschatological myths corresponding to the modern time which makes the future the principle of meaning". These principles find a melancholy tension in the immigrant's project, in which the sharpness of origins left behind comes up against the blurred anxieties of a future surrounded by a culture for whom one's myths of origin are unknown, irrelevant or even despised. While "shame" might not seem an appropriate term for the immigrant writer's response to this situation, for English cultural theorist Timothy Bewes "shame" is not simply a theme. For Bewes shame in postcolonial texts is a formal gap or lack which emblematizes the impossibility of writing past colonialism and its legacies, one of which is migration to the West. To write past colonialism and its legacies would imply that it has been understood, mastered and tidied away; that we can all move on.

This article explores the analytical traction provided by Bewes's theorization of shame not as a theme but as a formal aspect of creative texts, in this case with respect to the poetry of acclaimed American poet Li-Young Lee. Bewes's advocacy of shame as ethical response comes accordingly to seem relevant to much more than postcolonial writing, and in this case to Lee's poetic practice, a practice in which Lee's self-ascribed status as a "refugee of an illegible past" puts under notice the normative process of ascribing people to fixed cultural origins, in a poetry aware that the quality of its witness must emerge from its acquaintance with gaps, with the dismantled, and with tales told by others.

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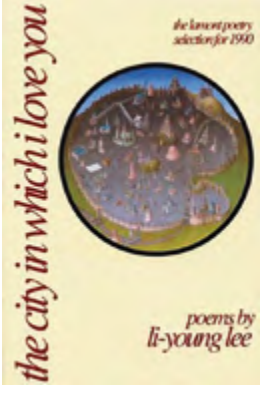

FIGURE 1
Poeta norteamericano de origem cultural chinês, Li-Young Lee.

Strontium and neodymium isotopic evidence in the identification of a Carboniferous intracontinental rift at northern Iran

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The Tuyeh-Darvar intrusion (Eastern Alborz zone, northern Iran) has a Carboniferous age and comprises monzonites and monzodiorites, composed mainly of plagioclase, orthoclase, quartz, hornblende and biotite. Strontium and neodymium isotopic data, as well as some elemental geochemical analysis by XRF, obtained at the UA in the scope of a post-graduate internship, had a major role in the characterization of this intrusion. The Tuyeh-Darvar rocks have high values of FeO^T/MgO, F/H_2O and Ga/Al ratios, high concentrations of alkalis, low abundances of CaO, MgO, and strong enrichments of LREE relative to HREE. The whole set of petrographic, geochemical and isotopic evidence shows that the Tuyeh-Darvar rocks may be classified as metaluminous, ferroan and alkalic granitoids of the A-type ("A" stands for both "alkaline" and "anorogenic").

The initial $^{87}Sr/^{86}Sr$ ratios of the studied rocks range from 0.70562 to 0.70678, whilst initial $^{143}Nd/^{144}Nd$ ratios vary between 0.512140 and 0.512160, corresponding to slightly negative initial εNd values (-1.1 to -1.5). These compositions plot in the an area of the Sr-Nd isotopic correlation (Fig.1) diagram where the fields of ocean island basalts and continental basalts overlap and also relatively close to the composition of enriched mantle I (EM I) component. As such, the Tuyeh-Darvar granitoids seem to derive by magmatic differentiation from mafic melts produced in an enriched asthenospheric mantle source below an intracontinental rift existing at the Alborz block in the Carboniferous times (Fig. 2)[a].

FIGURE 1
Sr-Nd isotopic correlation diagram. Isotopic composition calculated for an age of 327 Ma. Blue crosses – Tuyeh-Darvar granitoids.

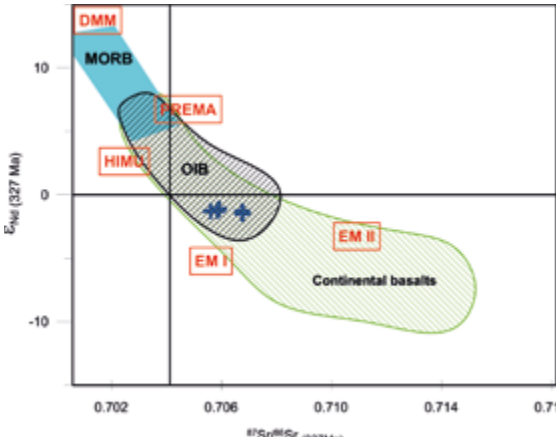
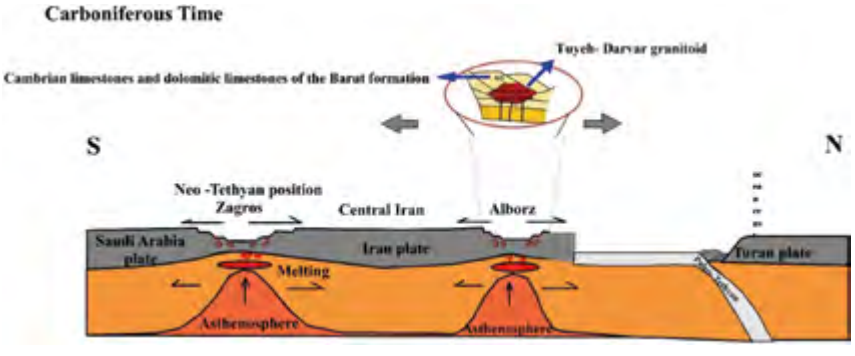


FIGURE 2
Tectonic model for the Alborz region at the time of the emplacement of the Tuyeh-Darvar intrusion.



[a] Naderi, A., Ghasemi, H., Santos, J.F., Rocha, F., Griffin, W.L., Moghadam, H.S. & Papadopoulou, L. (2018) – Petrogenesis and tectonic setting of the Tuyeh-Darvar Granitoid (Northern Iran): Constraints from zircon U-Pb geochronology and Sr-Nd isotope geochemistry. Lithos, vols. 318-319, p. 494-508. https://doi.org/10.1016/j.lithos.2018.08.034

Technological and compositional study of the gold leaf from Portuguese Baroque altarpieces from the northwest region

A. Bidarra[1, 2, 3], J. Coroado[1, 2], F. Rocha[1]

Throughout the second half of the 17th century and the first half of the 18th century, Portugal witnessed an increase in altarpiece production and in the use of gold in church decoration. The gold alloy composition should have properties that allowed it to be transformed in very thin leafs by the gold-beaters. The leafs were then applied by the gilders, over the carved and prepared wood.

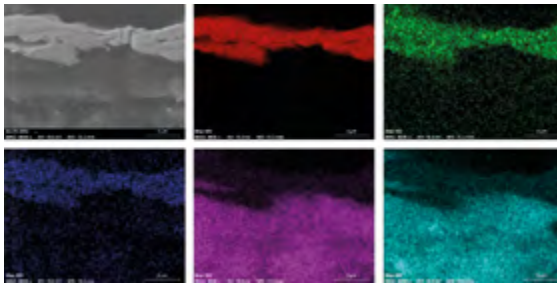
This research aimed to identify distinctive features in the gold applied in the main altarpieces of the churches of Jesus (Aveiro), São Bento da Vitória (Porto), Porto Cathedral, São Francisco (Porto), Santa Clara (Porto) and São Paulo (Braga).

The use of a multi analytical approach and the knowledge of the advantages and disadvantages of each method, made it possible to accurately study the gold leaf and the gilding technique.

Through a combination of optical microscopy (OM) and scanning electron microscopy with energy dispersive spectroscopy (SEM-EDS), it was possible to identify the presence of a water gilding with three distinct layers – gold, bole and ground – with no traces of regilding. The use of SEM-EDS allowed to define the elemental profile of the layers and to identify an alloy with approximately 22 carat. The trace elements were identified through inductively coupled plasma mass spectrometry (ICP-MS). The use of synchrotron radiation micro X-ray fluorescence (SR-μXRF), applied to Aveiro and Porto Cathedral samples, confirmed the presence of previous detected elements and allowed to define the layers elemental profile.

Considering that the analytical results point to a geological provenance from South American deposits and the historical sources confirm that Brazil was Europe main gold supplier and a Portuguese colony at the time of the gilding of the altarpieces, it can be assumed that the gold used has a Brazilian origin.

The definition of a profile for the gold through a well-structured and defined protocol, can be an asset in the setting of new historical, stylistic and technological approaches, revealing similarities ignored until now. In a final analysis, this profile will be an important advantage for the conservation and restoration of these art works. The knowledge of the gold characteristics and the applied techniques will allow to define a more accurate intervention methodology, based on the information of material and technological features of the altarpieces.



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3 — Cinábrio – Conservação e Restauro, Aveiro

FIGURE 1
Church of Jesus (Aveiro, Portugal) main altarpiece.

FIGURE 2
SEM-EDS image (8000x) of the cross-section of a sample from the church of Jesus main altarpiece and elemental mapping: Au, Ag, Cu, Al e Si.

New cars and emissions: effects of policies, macroeconomic impacts and cities characteristics in Portugal

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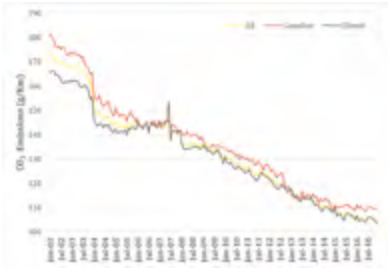
3 — ISCTE Business School & BRU-IUL, ISCTE – Instituto Universitário de Lisboa

The Paris Agreement on climate change is the first international climate agreement that extends mitigation obligations to all countries. Accordingly, the EU has already put in place some policy measures to decrease CO_2 and GHG emissions from cars, e.g. the obligation of each Member State to provide information on the fuel-efficiency of new passenger cars, namely on fuel consumption and CO_2 emissions. In Portugal, in 2013, the transport sector was responsible for 33.3% of energy consumption with the road transport accounting for 95% of this percentage. Furthermore, the transport sector was also responsible for 34.7% of CO_2 emissions, a value highly concentrated in the major cities. To drive significant reductions on emissions in the transport sector, the Government has introduced several energy efficiency measures. Although there are many countries that have introduced special programs aimed at increasing vehicle replacement through new low-carbon vehicles purchases, little attention has been paid to their impact on sales and prices. Results demonstrate that macroeconomic effects, household characteristics and city specificities are important variables to explain both CO_2 emissions and sales behavior, which allow inferring how policy makers should redirect attention when formulating new policies regarding environmental performance. Conclusions: Environmental consciousness of the Portuguese population is needed since the observed lower CO_2 emissions or higher sales of electrical vehicles may be related to the effect of the introduced laws rather than to the individual efforts to decrease global warming. This shows that we may have legislation imposing willingness to achieve the emissions level but not consumers' willingness to achieve it, as desired. This also leaves space for a higher intervention concerning population awareness for emission reduction needs and for the importance of choosing cars that should help achieving the emission reduction targets and consequently global warming reduction effects. Results demonstrate that macroeconomic effects, household characteristics and city specificities are important to explain both CO_2 emissions and sales behaviour. When long-term interest rates increase, the gasoline car sales decrease. However, only in this category, a significant impact was found. Regarding the population density effect, by considering high urban areas in Portugal (Lisbon and Porto), we observe that there is a positive and significant correlation between CO_2 emissions of new cars sold (for all, gasoline and diesel) and population, leading us to the conclusion that higher concentration of persons increases CO2 emissions, by increasing the circulation of vehicles by squared km. The cities specificities allow observing different impacts and the importance to consider city characteristics when designing policies regarding CO_2 abatement effects associated to new car sales. Provided the above evidence, we realise that when considering effects over average emissions of new cars sold and average sales we need to be aware of the region/city where we are analysing this interactive effects. As evidenced by the results, the consideration of different cities in our analysis changed the overall results and evidenced different impacts, in both sign and magnitude. In terms of electrical vehicles, the results are not so straightforward to interpret and seem to point into the same direction as of all cars sold. This may be because we have only observed effective sales of this kind of cars from 2010 onwards, since previously they almost did not exist or assumed a value of zero in our sample.

FIGURE 1
Sales of New Cars per month by Fuel Type between January 2002 and December 2016 (left vertical axis: sales values of gasoline and diesel cars; the right vertical axis: sales values of electric cars).

FIGURE 2
Average CO2 Emissions of New Cars sold in Portugal (Jan 2002-Dec 2016).



Place attachment, host-tourist interactions, and residents' attitudes towards tourism development: The Case of Boa Vista Island in Cape Verde

C. Eusébio[1], A. L. Vieira[1], S. Lima[2]

A clear understanding of residents' attitudes towards tourism development and its determinants is crucial for designing tourism development strategies to promote sustainable development. Although tourism is considered by political and development agents as one of the most important economic activities to promote the sustainable development of developing countries, a limited number of studies has been conducted in these countries. However, these destinations typically face several economic and social constraints that inhibit their integrated development, and the residents are frequently excluded from tourism decision-making and planning.

Tourism is nowadays one of the most important economic activities in the Cape Verde Archipelago. Nevertheless, tourism in this country has been developed based mainly on foreign investment. Consequently, the involvement of the local community in the tourism development process has been highly neglected.

In this context, the present study aims at developing and testing a structural model (see figure 1) to examine direct and indirect causal effects of place attachment, host-tourist interaction, and perceived positive and negative tourism impacts on the residents' attitudes towards tourism development in an island tourism destination – Boa Vista Island in Cape Verde.

The findings suggest that there is a relatively stronger residents' perception of negative effects when compared with residents' perception of positive effects (see table 1). This is possibly because the tourism development approach that has been adopted in this island is highly dependent on foreign investment. Consequently, the support for tourism development is also relatively week. Still, the residents show a robust place attachment. These results reveal several shortcomings of the tourism development model that has been employed in this island. Given that the inhabitants of this island are one of its most valuable assets, tourism should offer more perceived benefits than costs in order to encourage the residents' support for its development. The strong place attachment of the residents and their friendliness and hospitality should be included in the tourism development approaches and models. Inhabitants should be part of the tourism development process to stimulate sustainable development.

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FIGURE 1
Conceptual model proposed – factors influencing the residents' attitudes towards tourism development.

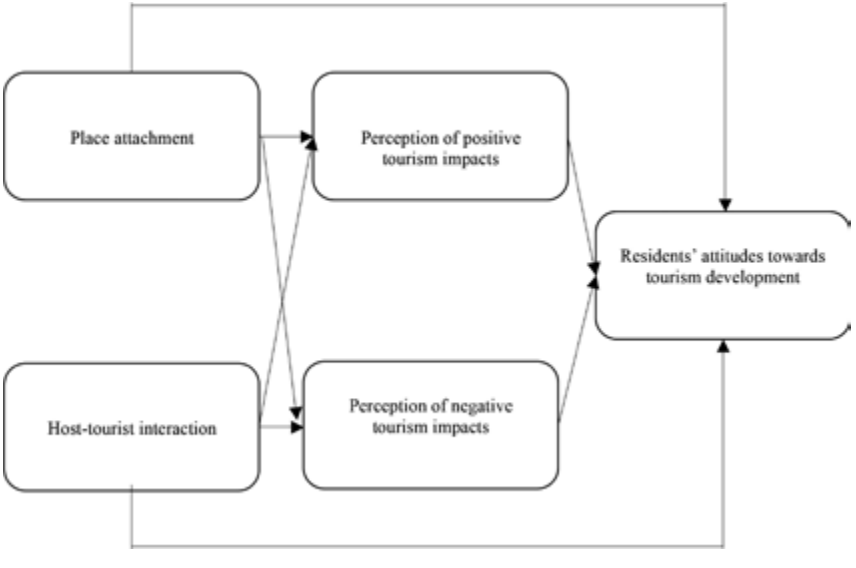

TABLE 1
Residents' attitudes towards tourism development and factors influencing these attitudes.

Dimensions analyzed*	N	Mean
Host-tourist interaction	300	4.35
Place attachment	300	6.05
Perception of negative tourism impacts	300	6.26
Perception of positive tourism impacts	300	4.54
Residents' attitudes towards tourism development	300	3.73

SunRiSE – measuring translation elongation at single-cell resolution by means of flow cytometry

R. J. Argüello[1], M. Reverendo[1], A. Mendes[1], V. Camosseto[1], A. G. Torres[3], L. Ribas de Pouplana[3,4], S. A. Van de Pavert [1], E. Gatti[1,2], P. Pierre[1,2]

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2 — Department of Medical Sciences & iBiMED and Ilidio Pinho Foundation, University of Aveiro
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4 — Catalan Institute for Research and Advanced Studies (ICREA), P/ Lluis Companys Barcelona, Spain

With this work, the group of Doctor Philippe Pierre proposes a new methodology of analysis of the protein synthesis that studies the elongation phase. The levels of protein synthesis control the folding of the proteins as they are produced and contribute to the stability of the messenger RNAs. Many factors regulate translation elongation, including tRNA levels, codon usage and phosphorylation of eukaryotic elongation factor2 (eEF2). Current methods to measure translation elongation lack single-cell resolution, require expression of multiple transgenes and have never been successfully applied ex vivo. The relative contribution of the different environmental and endogenous factors on translation elongation in cells directly isolated from human blood or mice tissues is poorly understood and is still methodologically demanding. Approaching these questions requires a technique with high-throughput potential and that measures translation elongation rates under physiological conditions in non-abundant and non-transformed cells ex vivo. Reduced manipulation and applicability to complex mixes of cells should also be a requirement for such a method. Here, we show, by using a combination of puromycilation detection and flow cytometry (a method we call 'SunRiSE'), that translation elongation can be measured accurately in primary cells in pure or heterogenous populations isolated from blood or tissues. This method allows for the simultaneous monitoring of multiple parameters, such as mTOR or S6K1/2 signaling activity, the cell cycle stage and phosphorylation of translation factors in single cells, without elaborated, costly and lengthy purification procedures.

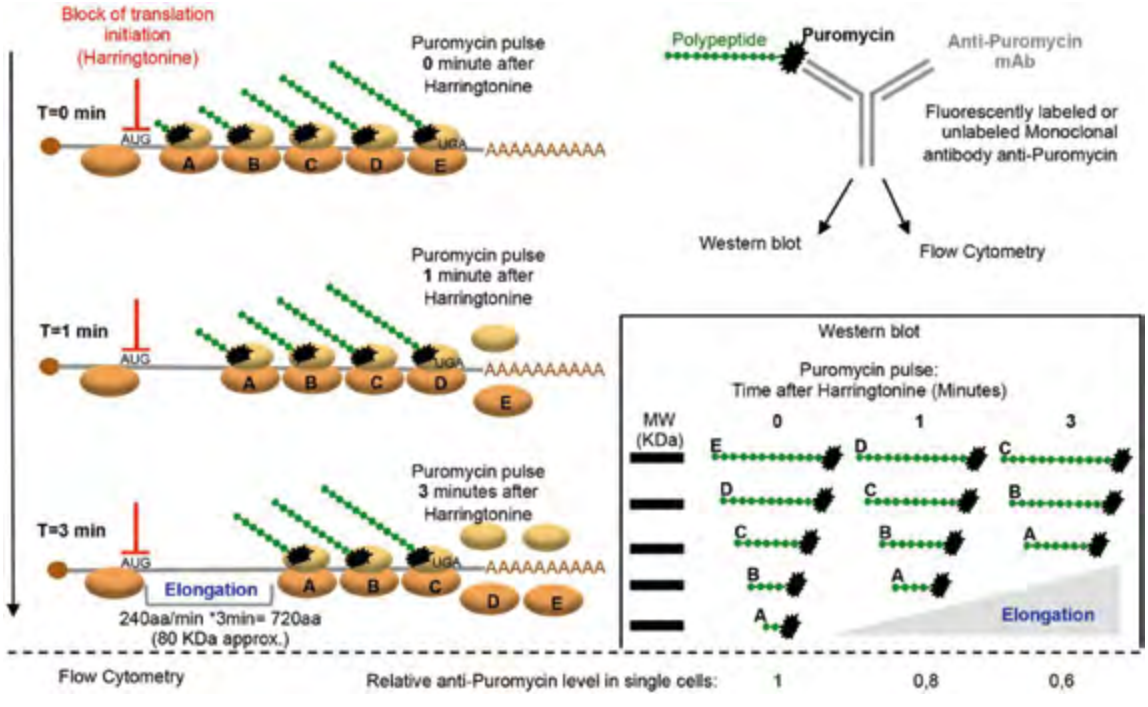

FIGURE 1
Schematic representation of the SunRiSE protocol and results. Cells are seeded in culture wells, and translation initiation is blocked by addition of harringtonine at time 0. Puro is added at different times after inhibition of translation initiation and is incorporated into nascent peptides by elongating ribosomes (denoted A–E). After a certain time of harringtonine treatment, pre-engaged ribosomes continue to elongate, and thus ribosomes that were bearing short peptides at T0, are associated with longer peptides after 240 s of treatment. Eventually translating ribosomes run-off from mRNAs, and the gap between the last initiating ribosomes and the translation initiation site will directly correlate with the elongation rate of the ribosomes, and therefore inversely correlate to the amount of puro incorporation. Puro incorporation is revealed by immunodetection through immunoblotting and flow cytometry, allowing a measure of puro incorporation decay (which correlated to the translation elongation rate) in bulk or at single-cell resolution. MW, molecular mass; aa, amino acids.

A Fluorescence-Based Sensor Assay that Monitors General Protein Aggregation in Human Cells

Marisa Pereira[1], Diogo Tomé[1], Ana S. Domingues[1], Ana S. Varanda[1], Cristiana Paulo[1], Manuel A. Santos[1], Ana Raquel Soares[1]

The accumulation of protein aggregates is a common feature of protein conformational disorders and is generally correlated with the onset of diseases, such as amyotrophic lateral sclerosis (ALS), Alzheimer's (AD), Parkinson's (PD), Huntington's (HD) disease and other age-related diseases (ARD).

Different in vitro and in vivo protein misfolding/aggregation monitoring strategies have been developed in recent years. However, most of the available protein aggregation sensors are limited to monitor a single class of proteins. With this in mind, we developed a protein aggregation sensor that can be used to monitor general protein aggregation in human cells and we have established a stable cell line to test it in multiple physiological conditions. For this, we took advantage of the observation that the small heat shock protein 27 (HSP27) is efficiently recruited by misfolded proteins (Figure 1-A). HSP27 binds to misfolded proteins forming a chaperone-substrate complex that permits refolding by larger ATP-dependent chaperones, namely HSP70 and HSP90 or directing proteins for degradation. Our data show that this sensor can detect a wide range of protein aggregates in cells and is a valuable tool to identify different protein misfolding/aggregation promoting conditions (Figure 1-B). One of the main features of this sensor is that it can be used in in vivo testing, allowing monitoring protein aggregation in a time dependent manner. We are currently using this protein aggregation sensor to perform high content screenings to identify genes that are essential for proteostasis and can therefore represent promising therapeutic targets for diseases where protein homeostasis is compromised. This sensor is also being used in drug screenings to identify drug candidates that modulate protein aggregation, representing a powerful tool in preclinical stages of the drug discovery pipeline.

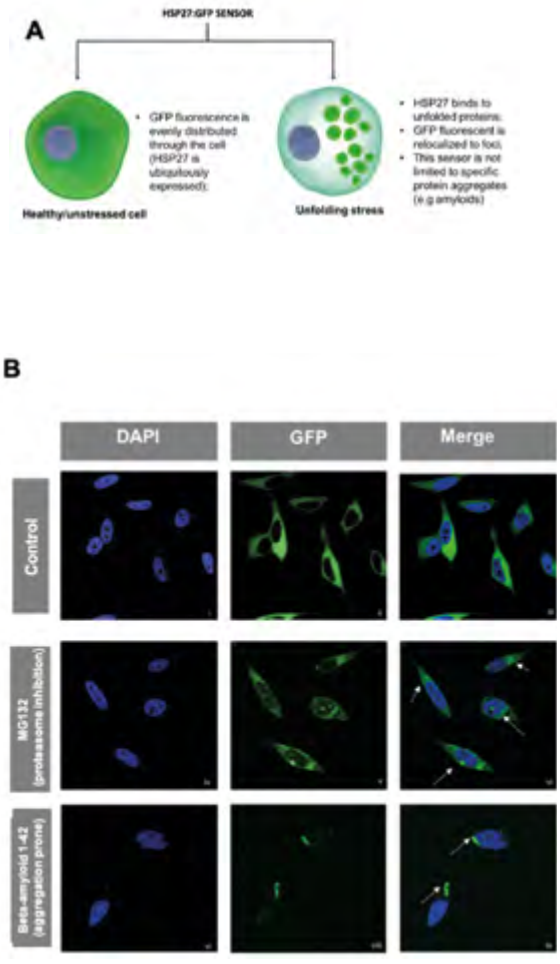

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FIGURE 1

HSP27:GFP detects general protein aggregation. A) HSP27:GFP sensor description. The HSP27:GFP protein aggregation sensor relies on the ability of HSP27 chaperone to be recruited to misfolded proteins. In healthy/unstressed cells, GFP is evenly distributed throughout the cell, as HSP27 is ubiquitously expressed. After exposure of cells to unfolded stresses, GFP fluorescence is relocalized to foci corresponding to misfolded proteins locations, as HSP27 is recruited to misfolded proteins to either stimulate their refolding, or target them to degradation. B) Confocal microscopy of HeLa cells expressing the HSP27:GFP sensor. HeLa HSP27:GFP cells were fixed, the nuclei stained with DAPI and observed under a Zeiss Confocal microscope in control conditions (i, ii, iii), after proteasome inhibition (iv, v, vi) and after incubation with an aggregation prone amyloid peptide (Aβ-1-42) (vii, viii, ix). In control conditions (i, ii, iii), the fluorescence is evenly distributed throughout the cells, as expected. After inhibition of the proteasome there is accumulation of misfolded proteins in the cytoplasm, as they are not actively being degraded. This accumulation is detected by the HSP27:GFP sensor (arrows) (iv, v, vi). The aggregation prone amyloid peptide (Aβ-1-42) is also detected by the protein aggregation sensor (arrows) (vii, viii, ix). Images were captured in separate channels using different lasers (Diode for DAPI and Argon for GFP detection) and merged using Image J.

GaAs:Si nanowires: critical reduction of the effect of ZB/WZ polytypism on the electronic structure

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The unique properties of semiconductor nanowires (NWs), such as: large surface-to-volume ratio, possible quantum confinement effects, NW's diameter dependence of excitation and emission of electronic states, give these nano-building blocks outstanding potential for electronic, photonic, mechanical, biological, and energy-conversion applications. The NWs' growth parameters influence the material composition, doping, and crystal quality, enabling to tailor their structural, electrical and optical properties, which are relevant for potential applications. Therefore, two major issues should be understood: i) the presence of polytypism (wurtzite (WZ) and zinc-blende (ZB)) that strongly influences the electronic structure of the NWs and ii) the ability to control the dopants in order to tune the semiconductor's optical and electrical properties. In this work, we study the effect of silicon (Si) doping on the electronic structure of GaAs NWs grown on GaAs (111) B substrates by molecular beam epitaxy. Si atoms can occupy both cation and anion sites in III–V semiconductors, i.e., they exhibit an amphoteric behaviour. For high doping levels, the presence of a huge density of charged defects creates fluctuations of the electric potential along the nanostructure. We demonstrate that the presence of such fluctuating potentials in the samples with the highest doping levels drastically decreases the influence of polytypism on the electronic structure, thus preventing the localization of charge carriers at the WZ/ZB interfaces (Fig.1).

Our findings are of high interest for optoelectronic applications based on III–V NWs and were achieved thanks to the fruitful collaborations of our group in UA with other European and Brazilian groups.

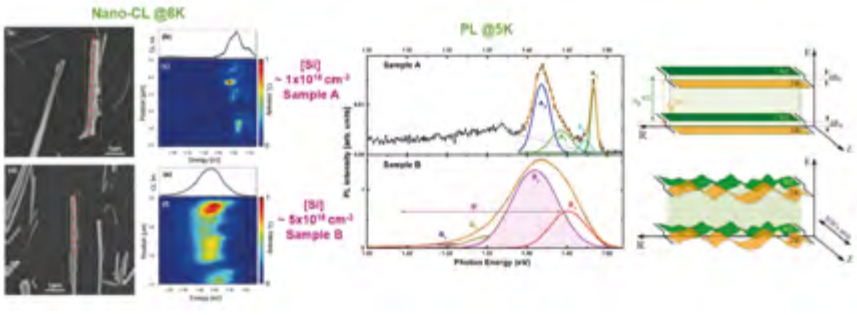
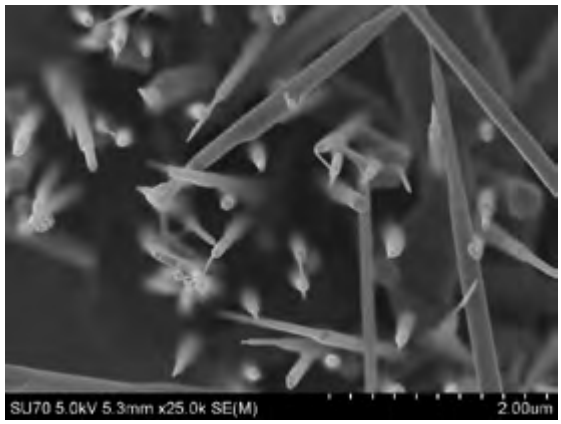
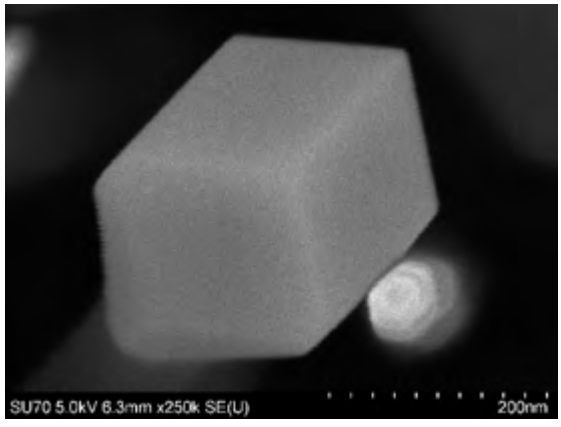


FIGURE 1
Left: Low-temperature hyperspectral cathodoluminescence (CL) images of individual Si-doped GaAs NWs. Middle: Low-temperature photoluminescence (PL) spectra measurement (black) and best-fit model (orange) using Gaussian components of Si-doped GaAs NW ensemble. Right: Electronic structure of Si-doped GaAs NW materials: ΔE_c and ΔE_v are the conduction and valence band offsets at the WZ/ZB interface. Upper figures correspond to the lightly doped NWs and lower figures correspond to highly doped and compensated NWs.





Laser-induced graphene strain sensors produced by ultraviolet irradiation of polyimide

Alexandre. F. Carvalho[1], António. J. S. Fernandes[1], Cátia Leitão[1], Jonas Deuermeier[2], Ana. C. Marques[2], Rodrigo Martins[2], E. Fortunato[2], Florinda. M. Costa[1]

In the new era of the "internet of things" there is a need for data to be processed. The smartification of our daily objects implies not only the ability of data processing but most importantly of data collecting. Nowadays a myriad of advanced MEMS (Micro-Electro-Mechanical Systems) sensors are already deployed in hi-tech appliances such as phones, computers and other electronic devices. However, in lower-end devices, such as wearables or smart furniture, applying such sophisticated sensors is an overkill approach. Thus, there is a requirement for low-cost, low-tech, and inexpensive sensing solutions. With the development of cheaper new synthesis and processing techniques, graphene and graphene-containing sensors are proving to be competitive in many fields as in photodetection, biosensing and electromechanical transduction. Laser-induced graphene (LIG) is one of those candidates and can be obtained by irradiation of a polymer, such as Kapton, by a laser source.

The I3N | Carbon-based Materials and Laser Processing group demonstrated that it is possible to obtain LIG foams using an ultraviolet laser instead of the typical infrared CO_2 laser source (Fig.1). Using this approach, a four-fold decrease in the penetration depth (5 µm) is achieved, while the spatial resolution is doubled, when comparing to the state-of-the-art. Electromechanical strain LIG sensors were patterned in polyimide substrates with different thicknesses and their performance to strain, bending and force inputs was measured. A low-cost arterial pulse wave monitor was built, exploring the high force sensitivity of the sensors produced on the thinner substrates (Fig.2).

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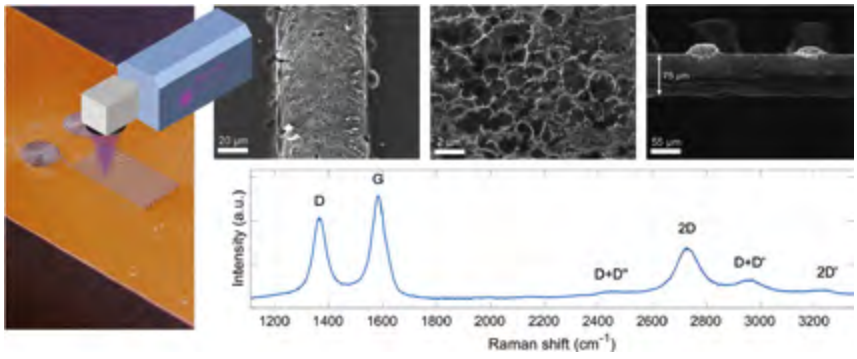
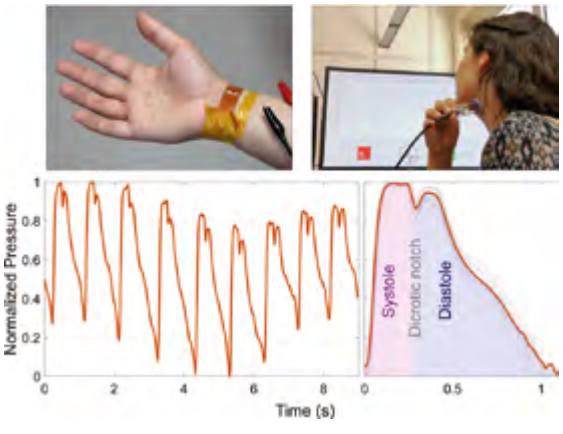
FIGURE 1
Sketch of the laser induced graphene strain sensors synthesis. Microstructural features and Raman spectroscopic evidence of graphene.

FIGURE 2
Arterial waveform pressure sensors based on laser induced graphene and their response.





Finding the optimal nets for self-folding Kirigami

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The synthesis of three-dimensional polyhedral shells at the micron and nano scales is key for encapsulation and drug delivery. Inspired by the Japanese art of Kirigami, where hollowed structures are obtained from cutting and folding a sheet of paper, lithographic methods have been developed to form shells from two-dimensional templates of interconnected panels. The potential is enormous, for a wide range of shapes and sizes can be obtained. Ideally, the unfolded templates (nets) should spontaneously self-fold into the target structure to reduce production costs and achieve large-scale parallel production.

The optimal nets are the ones that maximize the number of vertex connections, i.e., vertices that have only two of its faces cut away from each other in the net. Previous methods for finding such nets are based on random search and thus do not guarantee the optimal solution. Here, we propose a deterministic procedure. We map the connectivity of the shell into a shell graph, where the nodes and links of the graph represent the vertices and edges of the shell, respectively. Identifying the nets that maximize the number of vertex connections corresponds to finding the set of maximum leaf spanning trees of the shell graph. This method allows not only to design the self-assembly of much larger shell structures but also to apply additional design criteria, as a complete catalog of the maximum leaf spanning trees is obtained.

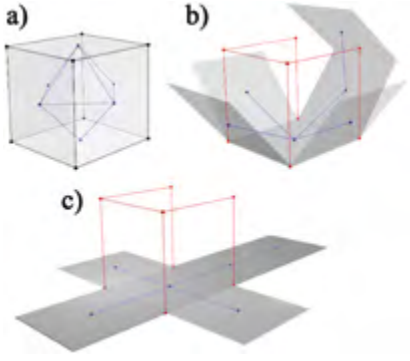

FIGURE 1
Net of a cubic shell. (a) The cubic shell is mapped into a shell graph (black), where nodes and links of the shell graph are the vertices and edges of the polyhedron, respectively. In the face graph (blue), the nodes are the shell faces and the links connect pairs of adjacent faces. To unfold the shell into a two-dimensional template (net), one needs to remove a set of shell edges (e.g., red links in (b) and (c)).

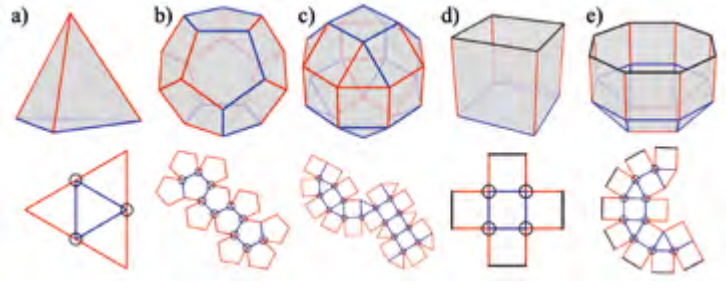

FIGURE 2
Five examples of shells and of one of their nets corresponding to a cut that is a maximum leaf spanning tree: a) tetrahedron, with four faces and nine edges, it has four maximum leaf spanning trees, but only one non-isomorphic; b) dodecahedron, with twelve faces and thirty edges, it has 1980 maximum leaf spanning trees, but only 21 non-isomorphic; c) small rhombicuboctahedron, with 26 faces and 48 edges, it has 1536 maximum leaf spanning trees, but only 32 non-isomorphic; d) open cubic shell, with five faces and twelve edges, it has only one maximum leaf spanning tree e) small rhombicuboctahedron with the top nine faces removed and 17 faces, 36 edges and 20 nodes remaining, it has 720 maximum leaf spanning trees, but only 90 non-isomorphic. The black circles in the nets indicate the vertex connections.

Can aesthetics instigate the reintegration of waste into new products, promoting circular economy?

Diogo Frias[1], Francisco Providência[1], Ana Velosa[2]

The increase in energy expenditure by 100% over the last 25 years is representative of the increase in the consumption of tradable goods worldwide and its consequent production, having as direct effect serious issues of management, storage and eventual reuse of industrial waste.

According to (Liboiron, 2010) the ratio of industrial waste production to domestic waste is 97-3, which clearly demonstrates the scale of the problem we're facing. Given the current solution for waste to be deposited in landfills, it is urgent to discover new solutions for the reuse of the various types of waste. According to Eurostat (2017), in 2014 approximately 2320 million tonnes of waste were treated in the European Union (domestic, agriculture, mining, energy, water treatment, construction, manufacturing, and other sectors), with only 36 , 2% of the total treated wastes being sent to recovery operations called recycling. Of the total of waste produced in Europe, a considerable amount is related to industrial waste, which according to the CVR, is around 300,000,000 tonnes per year. Included in the category of industrial waste are residues such as sludge from the aluminum anodizing process, steel slag, effluent sludge, fly ash, among others, the destination of which is mostly direct landfill (except fly ash, usually included in Portland cement production). The management of industrial waste, in particular, is carried out in most cases by companies specialized in waste management, making them not visible/perceptible or accessible to the general population, requiring that their reintegration in the value chain, must pass by an industrial context. In this sense, it was identified the opportunity for the development of artifacts capable of integrating industrial waste of categories C and F, produced by companies from the North of Portugal, in a way to valorize them, enhancing through design different physical, chromatic, plastic and resistance to use and aging, not forgetting their economic relevance. In this sense, it was proposed the development of a series of innovative products for Architecture and Urbanism, under the brand Geodesign that adopt an aesthetics that is designated by eco-brutalist.

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Features, Behavioral Change Techniques, and Quality of the Most Popular Mobile Apps to Measure Physical Activity: Systematic Search in App Stores

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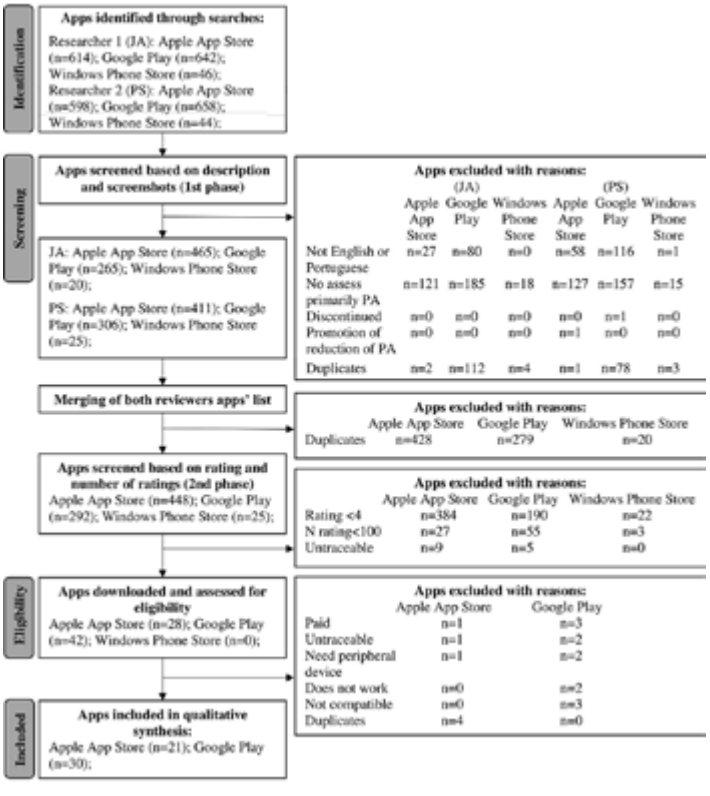
It is estimated that 23% of adults and 55% of older adults do not meet the recommended levels of physical activity. Thus, promoting physical activity is of paramount importance, but it requires the use of low-cost resources to facilitate universal access without depleting the health system. Existing apps constitute an opportunity, but it is difficult for the layperson to select the most appropriate one, due to the lack of information and quality.

The objective of this study was to assess the features, content, and quality of the most popular apps that can be used to measure and, potentially, promote physical activity.



Systematic searches were conducted on Apple App Store, Google Play, and Windows Phone Store between December 2017 and January 2018. Apps were included if their primary objective was to assess physical activity, if they had a user rating of at least 4, if their number of ratings was ≥100, and if they were free. Included apps were independently assessed by two reviewers regarding aspects related to technical information, physical activity, behavioral change techniques, and quality. Data were analyzed using means and SDs or frequencies and percentages.

Of 51 apps included, only one mentioned the involvement of health professionals. Regarding physical activity, most apps measured steps and distance (n=11) or steps, distance, and time (n=17). Only 18 apps, all of which measured number of steps, followed the guidelines on recommendations for physical activity. On average, 5.5 (SD 1.8) behavioral change techniques were identified per app; the most frequently used techniques were "provide feedback on performance" (n=50) and "prompt self-monitoring of behavior" (n=50). The overall quality score was 3.88 (SD 0.34).

The quality of apps content, should be improved, namely by the use of international guidelines on physical activity. Additionally, a more in-depth assessment of apps (e.g. reliability and validity) should be performed before releasing them for public use.

Federation of Attribute Providers for User Self-Sovereign Identity

Pedro Coelho[1], André Zúquete[2], Hélder Gomes[3]

Today, people expect that companies and public institutions will provide many of their services through the Internet. However, this calls for a general-purpose, attribute attestation system, capable of allowing people to collect and remotely provide their digitally certified attributes to service providers on a needed basis.

These attributes belong to the set that represents a person's identity. They can be perpetual, ephemeral or can vary over time. An attribute is some piece of data about a person that often can be attested by some trusted party. Such attestation is essential to allow a person to claim their ownership when interacting with service providers. The concept of self-sovereign identity rose from a citizen-centric identity turned into an interoperable, federated identity. A citizen-centric identity means that citizens must be central to the administration of their identity. This requires not only interoperability of such identity across multiple locations but also true control of identity. This control refers to how, when, for how long and to whom users citizens disclose portions of their identity, i.e. attributes.

We designed a system that provides trusted, personal attributes to service providers and facilitates the organization and distribution of those attributes by their owners, while adhering to the principles of self-sovereign identity [1].

The system recognizes four groups of entities (or roles): Users, Attribute Providers (APs), Regulation Bodies (RBs) and Service Providers (SPs). RBs are responsible to manage and supervise the set of APs that may participate in the system. APs certify and publish Users' attributes upon their request, and may latter revoke them. Users provide trustworthy, certified attributes of their own to SPs on a need-to-know basis. All certificate requests and certified attributes are privately and centrally stored in a permissioned blockchain, maintained by RBs and APs. Privacy is ensured by pseudonyms managed by Users.

For ensuring privacy, each certified attribute is bound to a pseudonym. The set of pseudonyms of each User is managed through their wallet. For confidentiality, certified attributes can be obfuscated.

A User wallet is a fundamental piece for managing the issuing and the exploitation of the user certified attributes. A wallet keeps the references to all the certified attributes belonging to its owner and the elements for revealing obfuscated attributes.

[1] P. Coelho, A. Zúquete, H. Gomes, "Federation of Attribute Providers for User Self-Sovereign Identity", J. of Information Systems Engineering & Management, 3(4), Nov 2018

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Model-Based Control using Interval Type-2 Fuzzy Logic Systems

Rómulo Antão[1], Alexandre Mota[1], Rui Escadas Martins[1]

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The development of control algorithms flexible enough to correctly manipulate real world processes close to their best performance without human supervision has been one the most sought goals of control and system modelling theory.

Recently, the formalisms of the new Type 2 Fuzzy Logic introduced methodologies capable of overcoming the inherent uncertainties of approximating real world processes by a computational model. Yet, despite increasingly present in non-linear modelling literature, model-based control theory is currently not taking full advantage of the improvements that Type 2 Fuzzy Logic provides. Therefore, the present work proposes the development of a new control methodology based on the Generalized Predictive Control (GPC) theory supported by Interval Type 2 Takagi Sugeno Fuzzy Logic Systems (Type 2 TS FLS), as presented in Figure 1.

The developed control algorithm is based on locally linear approximations of the Type 2 Takagi Sugeno model and is evaluated using a non-linear process based on the yeast fermentation reaction. The performance of the closed loop systems is evaluated by subjecting the process to quick changes in the operation regime and to unmeasured external disturbances.

As depicted in Fig.2, the achieved results demonstrate that, at the expense of a small increase in the computational effort, the use of a Type 2 Fuzzy Logic System improved the accuracy of the process's prediction model and provided a better support for the employed control strategy comparatively to other GPC state-of-the art implementations. Control systems developed according to this modelling approach evinced an overall improved transient behaviour, presenting significant advantages when the controlled process is subject to unmodeled disturbances. The proposed method stands as an alternative to non-linear Model Predictive Control methods that require more complex online non-linear optimization algorithms to extrapolate the optimal control actions in real-time.

FIGURE 1
Structure of the MPC algorithm based on Type 2 Takagi Sugeno Fuzzy Models (Type 2 TS FM).

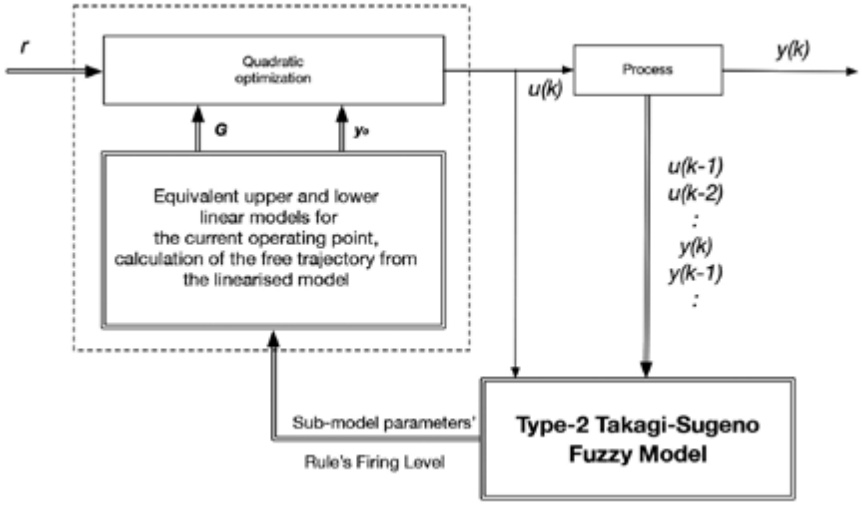
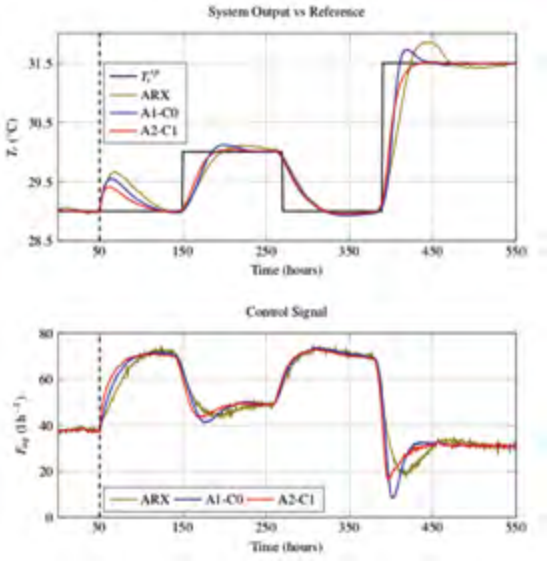


FIGURE 2
Evaluation of the closed loop performance after the Fermentation process is disturbed by a change in the inlet Substrate temperature at instant Time=50 (ARX – Auto-Regressive model with eXogenous inputs; A1 C0: Type 1 TS FLS; A2 C1: Type 2 TS FLS).



XyLoops: Composition and performance of a work for xylophone and live electronics (live looping)

Helvio Monteiro Mendes[1], Alexsander Jorge Duarte[1], Cesar Adriano Traldi[2]

We present the process of composition and performance of the work titled XyLoops [1], composed for xylophone and live electronics, elaborated within the research project focused on Live Looping, developed through the Live Looping Laboratory (LoopLab / INET-md) of the Department of Communication and Art, University of Aveiro and the Nucleus of Music and Technology (NUMUT), Institute of Arts of the Federal University of Uberlândia.

XyLoops was composed in scope of a laboratory of musical performative practices, involving three musicians-researchers who performed different functions: 1) Idealizer of the compositional structure; 2) Enabler and creator of the technological structure through the Loop Station´s configuration and real time sound processing by effect pedals; and, 3) Performer experimenting and suggesting questions related to the instrumental and technological part of the work.

This work is part of a model of scientific research called "shared research practices" (Sardo, 2017: 231), which allows greater democratization of the construction and access to scientifically produced knowledge. The methodology adopted went through the following steps: a) Survey of the existing repertoire for xylophone and electronics in real time, which allowed the research contextualization within the repertoire of the instrument, as well as identify compositional and interpretative questions; b) Live Looping´s conceptual study, aiming contextualize the research and survey technical and conceptual issues from this area; c) The information collected in the first two steps provided the work´s compositional structure, basing the material to start the practical experiments of this research; d) Experimentation sessions allowed to solve technical issues related with electronic devices and also interpretative questions, from music score´s reading and also performance required for this work.

The innovative character of this composition contributes to the expansion and development of the repertoire for xylophone and aims to assist interpreters and composers during the process of performance and composition of works for instruments and electronics in real time, focused on Live Looping.

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2 — Institute of Arts of the Federal University of Uberlândia, Brazil

FIGURE 1
Equipment and connections used to perform the work XyLoops.

FIGURE 2
XyLoops performance at LoopLab/ INET-md.

[1] http://vortex.unespar.edu.br/mendes_duarte_traldi_v6_n2b.pdf

Adaptation of a Self-Regulated Practice Behaviour Scale for Portuguese music students

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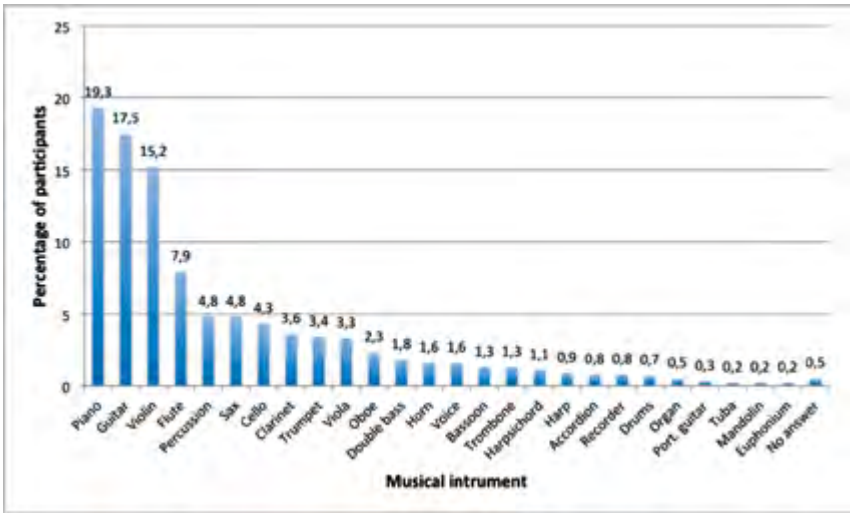
3 — UFRGS, Brazil
4 — University College London, Institute of Education, UK

The aim of this study was to analyse the validity and reliability of the Self-Regulated Practice Behaviour Scale (SRPB) developed by Miksza (2012) for music students in Portugal. Tasks involved in this study included: (1) translating the original scale and creating a viable Portuguese adaptation for Portuguese musical performance students; (2) analysing the psychometric properties of the Portuguese version of the scale. The translation and adaptation of the original scale resulted in a 52-item Portuguese Self-Regulated Practice Behaviour measure (Portuguese SRPB). Students enrolled in music education programmes from eight conservatoires answered the Portuguese SRPB (n = 1,200). The results of confirmatory factor analysis show that a five-factor model presenting the five correspondent theoretical dimensions of self-regulation (motive, method, behaviour, time management, and social influence) achieved the best fit to the data collected. All Portuguese SRPB dimensions were predictive of students' reports of average practice efficiency, grades, and practice time, highlighting preliminary evidence of predictive validity. The internal consistency reliability coefficients ranged from good to excellent (α = .71 to .84). The findings suggest that the Portuguese SRPB produced a valid and reliable measure of the self-regulatory practice behaviour of Portuguese conservatoire students, which can be applied by music educators and researchers to assess the practice efficiency of Portuguese music students.



Multi-drone Control with Autonomous Mission Support

Nuno Paula[1], Bruno Areias[1], André Braga Reis[1], Susana Sargento[1]

Recent advancements on miniaturization and cost of sensors and instruments have promoted a growth in the usage of drones in an increasingly wide range of scenarios such as search and rescue, agriculture and environmental monitoring. However, most mechanisms for drone control still require an active pilot, limiting the ability to execute complex missions, especially when multiple drones are involved. Leveraging recent advances in the autonomous capabilities of commercially-available drone equipment, we introduce a complete and modular solution for controlling multiple drones, implementing the functionality necessary for inexperienced users to plan, execute and monitor complex missions that require drone cooperation.

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We seek to combine the advantages of a single Unmanned Aerial Vehicle (UAV) with the advantages of a swarm, including the possibility of continuously executing a mission even when an unexpected event results in the loss of a drone. This increases mission flexibility by allowing a set of drones to dynamically adapt to a mission to, for example, increase the capacity for area coverage.

Through a reference set of real-life experiments, ranging from simple tests to the baseline capabilities of the platform to more sophisticated tasks which require the automation of full paths and multiple drone collaborative missions, the features of the platform have been thoroughly verified and profiled, and the successful completion of the proposed experiments shows that the platform is able to correctly handle the execution of missions containing large sequences of commands and waypoints.

This platform is a basis for the research of new networking approaches to interconnect multiple drones in the air, their sensors, and provide a nomadic network in the air for the support of future beyond 5G services.

Towards IoT data classification through semantic features

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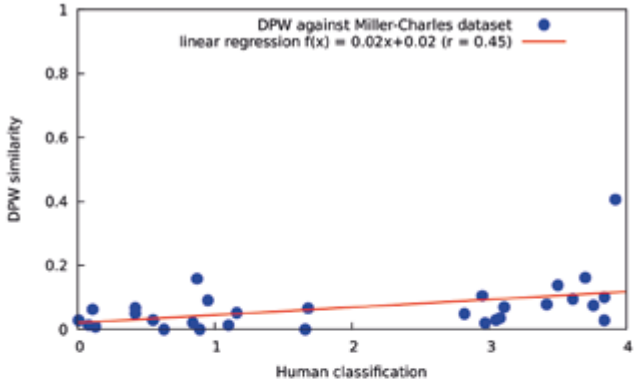
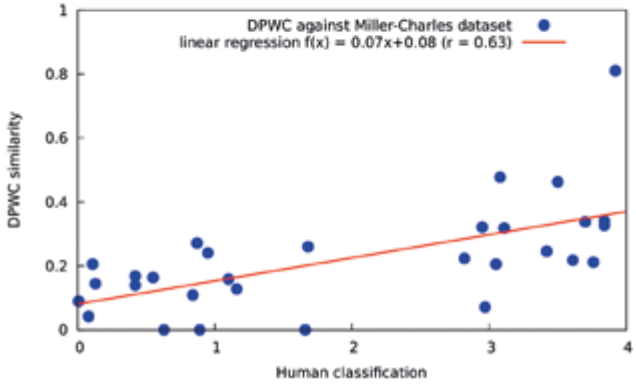
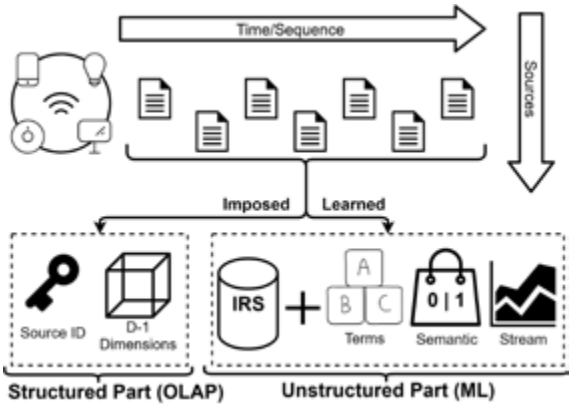
2 — Department of Electronics, Telecommunication and Informatics & IT, University of Aveiro

The technological world has grown by incorporating billions of small sensing devices, collecting and sharing huge amounts of diversified data. As the number of such devices grows, it becomes increasingly difficult to manage all these new data sources. Currently, there is no uniform way to represent, share, and understand IoT data, leading to information silos that hinder the realization of complex IoT/M2M scenarios. IoT/M2M scenarios will only achieve their full potential when the devices work and learn together with minimal human intervention. In our approach, we accept the diversity of context representation as a consequence of economic pressures and have developed concepts that excel in these environments. In previous works, we proposed a d-dimension organization model and semantic features specifically for IoT. In this work, we discuss the limitations of current storage and analytical solutions, point the advantages of semantic approaches for context organization and extend our unsupervised model to learn word categories automatically.

Our solution was evaluated against Miller-Charles dataset and an IoT semantic dataset extracted from a popular IoT platform, achieving a correlation of 0.63. There is still room for improvement, hypernyms can be used to learn more abstract dimensions improving performance. Non-negative matrix factorization can also be used to discover latent semantic information in distributional profiles and increase accuracy. Apart from context-aware applications and IoT/M2M scenarios, several other areas benefit from semantic based context organization. For example, these methods could provide a decisive contribution towards the exploration of name-based information centric network architectures in IoT environments.







Photonic processor for next-generation communications satellites

Vanessa Duarte[1], Carlos Ribeiro[1], João Prata[1], Miguel Drummond[1], Rogerio Nogueira[1]

One of the priorities identified by the United Nations for Global progress is to make Internet accessible from any point around the Globe, as closing such a digital divide is very important especially for Education purposes. As fiber cannot reach everyone everywhere, ubiquitous satellite communications are in a leading position for fulfilling such a mission.

A new generation of communications satellites is required. New satellites will be powered by large-scale processors, enabling a dynamic allocation of hundreds of beams with a total capacity beyond 1 Tb/s. However, such an ambitious goal has been deemed as over-ambitious if current RF or digital technologies are used. A technologically disruptive approach to build communications satellites is therefore required.

The main goal of this work was to demonstrate photonics as a key enabling technology for building the new generation of communications satellites. Such a goal was successfully achieved, which also led to many pioneering results, namely the first ever demonstration of a real-time photonic beamformer for processing 4 input Ka band signals (1Gbit/s QPSK at 28GHz carrier), including an array of modulators, a multi-core optical fiber amplifier and a silicon photonic integrated beamformer. In comparison with an RF processor, the demonstrated photonic processor enables a size reduction by a factor of 5000. Such a demonstration was performed live at the optical communications laboratories of Instituto de Telecomunicações, in Aveiro. These outcomes resulted in one international patent (already granted), and multiple publications in top-ranked international conferences and journals, with the last article published in Nature Communications.

Ms. Vanessa Duarte, a PhD student working full time in this work, was also the Academy Winner of the prestigious Altice Innovation Award 2018 as well as of ANI Born from Knowledge Award.

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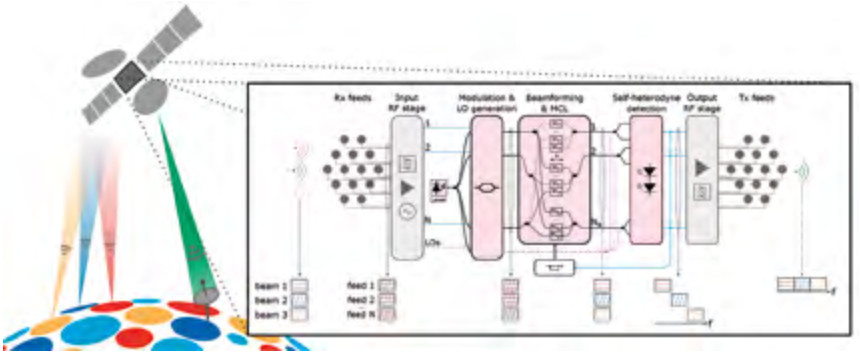

The Design of functional hybrids for enviromental and biological applications

N. M. M. Moura[1], C. I. V. Ramos[1], Ana R. Monteiro[1], Carla I.M.Santos[1], M. Amparo F. Faustino[1], Sara R. D. Gamelas[1], Ana T. P. C. Gomes[1], M. Graça P. M. S. Neves[1], André P. Carvalho[2], Sérgio M. Santos[2], Sara Fateixa[2], Tiago Fernandes[2], Ana L. Daniel-da-Silva[2], Tito Trindade[2], Marta I. S. Veríssimo[3], M. Teresa S. R. Gomes[3], Gil Goncalves[4], Paula A. A. P. Marques[4]

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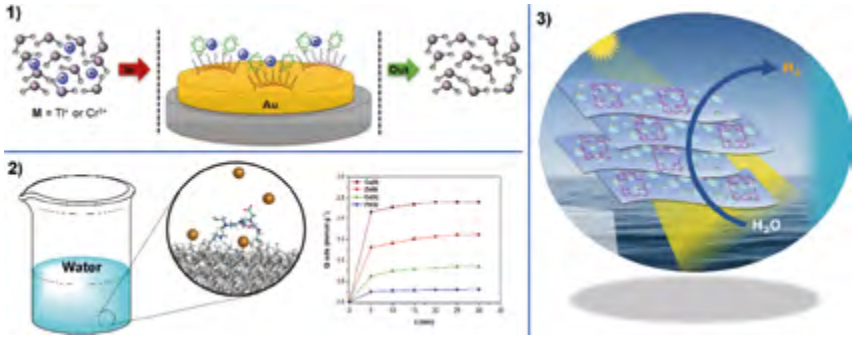
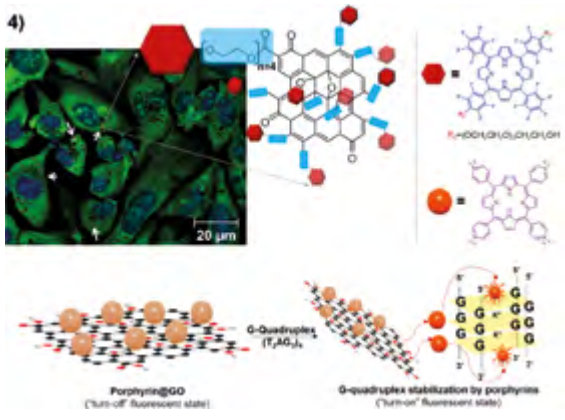
FIGURE 1
Mold cavity containing the SMPU with the embedded FBG and evolution of the Bragg wavelength along with the injection time.

The design of materials with appropriate features for a special application is meriting high interest between the scientific communities. Under this context novel materials decorated with organic compounds were developed for environmental and biomedical applications. The new materials demonstrated a synergic effect between the properties of the organic counterpart and the solid support selected and high potential to act as 1) adsorbent for metal cations removal from water; 2) metal cations detection; 3) photocatalyst for H_2 production from water, and 4) antitumor drug, detecting and stabilizing DNA G-quadruplexes. Knowing that the effects associated to overpopulation and pollution is putting in risk WATER and among the pollutants heavy metals merit a special attention, we found that piezoelectric quartz crystal gold electrodes coated with a *N*-confused porphyrin immobilized on silica or Merrifield resin respond to Tl^{+} and Cr^{3+}, showing an higher sensitivity to Cr^{3+} [1]. The immobilization of amino penta-carboxylic acid on silica also afforded a highly chelating and stable hybrid adsorbent for Cu^{2+}, Zn^{2+}, Cd^{2+} and Pb^{2+} and its application for metals extraction from natural waters was reliable [2]. Another promising research is related with the development of photocatalysts based on graphitic carbon nitride (g-C_3N_4) to generate H2 from water splitting. The works developed demonstrated that the sensitization of g-C_3N_4 with porphyrins or holey g-C_3N_4 doped with carbon enhances the photocatalytic H_2 evolution under visible light irradiation, making them potential materials for solar conversion to produce H2 from water [3,4]. Our expertise led us to develop nanoplatforms containing porphyrins and graphene oxide (GO) to promote the selective detection and stabilization of DNA guanine-quadruplex (G-Q) structures, paving the way for a new class of antitumor drugs, based on the inhibition of telomerase. New hybrids biocompatible with human Saos-2 cells were also prepared based on porphyrins with glycol branches covalently attached to GO nano-sheets; the results are very promising for future application namely in cancer therapy.





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Olives, olive oils and their by-products: using a lipidomic platform for providing a molecular fingerprint of value-added foodstuff and valorisation of their industrial waste

Eliana Alves[1], Tânia Melo[2], Felisa Rey[2,3], Pedro Domingues[1], M. Rosário M. Domingues[2]

Olives (Olea europaea L.) and olive oil have been used for millennia in the diet of Mediterranean populations, and their consumption is associated with several health benefits. At the Mass Spectrometry Centre, we have been developing lipidomic-based methodologies to solve the main problems faced by the olive and olive-derived products' industries, such as the detection of fraud and adulteration, the traceability, and the identity of origin of olives and olive oil. Using mass spectrometry (MS)-based tools, we aim to propose a chemical ID card both for olives and virgin olive oils. We also aim to provide a new insight into the bioprospection of olives and olive oil for their exploitation as high value-added foodstuff to be used in healthy diets. Likewise, we aim to foresee the sustainable reuse of solid wastes (pulp, seeds, kernels), which is key to value these industrial by-products as sources of bioactive lipids.

Lipid phenotyping using MS-based tools has shown that each virgin olive oil has a unique lipid fingerprint [1]. Besides, hundreds of compounds have been identified in the lipidome of the olive pulp[2,3] and seed [4] from the Portuguese olive variety Galega, including triacylglycerols and polar lipids.

Different projects are ongoing for optimising the identification of the lipid markers that will represent the unequivocal molecular ID card for the Portuguese olives and top-quality olive oils. The chemical phenotyping will be used to value table olives and olive derivatives as privileged foods with high nutritional value, alerting the final consumers, making them more informed and demanding on their quality. These aims consider the different dimensions of sustainable development underlying the goals of the United Nations' Agenda for 2030.

This research work has had the kind collaboration of Portuguese partners: the company M&L Pato, Lda. (Bairrada), Cooperativa de Olivicultores de Nelas (Nelas), and Prof. José Alberto Pereira (Polytechnic Institute of Bragança).

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FIGURE 1
Different targets of mass spectrometry-based lipid phenotyping of olives, virgin olive oils and olive-derived industrial by-products.

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Brewer's yeast cell wall adaptation allows its reutilization in brewing, maintaining the yeasts and beer metabolomic profile

Elisabete Coelho[1], Cátia Martins[1], Rita Bastos[1], Tiago Brandão[2], Adelaide Almeida[3], Sílvia M. Rocha[1], Manuel A. Coimbra[1]

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2 —Super Bock Group, SA, Leça do Balio
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Brewer's yeasts are usually subject to reuse (repitching) in consecutive fermentations, i.e. yeasts are pitched, cropped, and then repitched. Their performance along serial repitching may be affected by several parameters (e.g. osmotic, oxidative, thermal or mechanical stress). Saccharomyces pastorianus displayed no changes regarding its viability (number of cells per mL), as shown in figure. Also, vitality, assessed by flocculation capacity, acidification power, and petite mutation formation, did not show significant variations after 5 consecutive fermentations, much higher than that observed for the inoculum yeast. In fact, yeasts adaption to the fermentation broth to improve the fermentative performance is essential. This adaptation is also noticed in cell wall polysaccharides that confer strength to the cells, namely the glucans, generally described as β1,3-glucans. After the consecutive fermentations, yeasts cell wall polysaccharides are modified by the increase of both α and β1,4-linkages, as observed by the analysis of the Brewers Spent Yeast (BSY), with concomitant decrease of β1,3 ones, conferring resistance to the yeasts. The cell wall modifications may have an essential role for the yeast tolerance during the brewing process, and be repitched several times due to the presence of cellulose-like and glycogen-like polysaccharides. Furthermore, this yeasts' tolerance promotes consistency of the metabolic performance and consequently, a stable beer aroma along the serial repitching operations, as observed by solid-phase microextraction coupled to comprehensive two-dimensional gas chromatography with time-of-flight mass spectrometry (SPME/GC×GC-ToFMS).

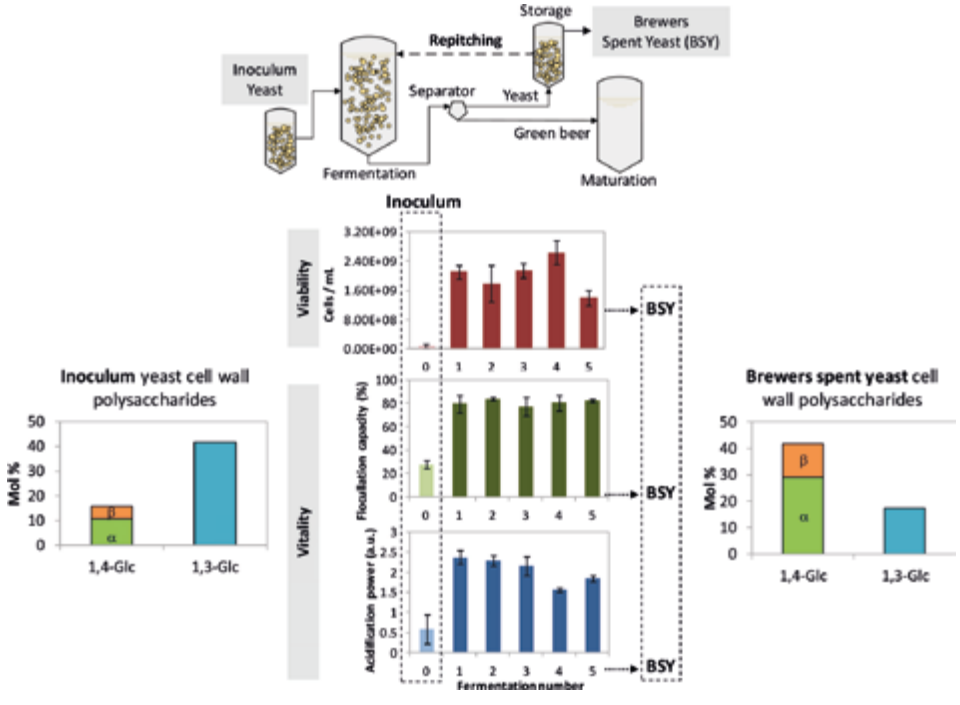

FIGURE 1
Mold cavity containing the SMPU with the embedded FBG and evolution of the Bragg wavelength along with the injection time.

Multifunctional cementitious composite with carbon black for traffic monitoring

André Monteiro[1], Pedro Costa[2], Markus Oeser[3], Paulo Cachim[1]

Societies increasingly search for more efficient and resilient structures and infrastructures. These infrastructures are commonly part of networks, where an adequate management can only be achieved with the existence of data regarding their use. Development of these concepts in the last years lead to the advent of the so-called smart infrastructures. Traffic logistics has been one of the fields which has benefited the most of such advances, with the implementation of the so-called Intelligent Transportation Systems. During the last years, advances in materials science enabled the development of a wide range of "smart" construction materials capable of autonomous tasks. An example of these are the piezoresistive cementitious composites, some of which may be used as monitoring systems, due to their self-sensing properties.

The present research aims to bridge the concept of multifunctional cement-based materials to the traffic monitoring discipline, through the use of stress-sensitive cementitious composites, based on the addition of carbon black (CB) particles. These materials, working under the piezoresistive concept, were developed for application in pavement aiming to perform permanent real-time evaluation of traffic data. Using cementitous composites with CB has some advantages compared to traditional monitoring devices and solutions, due to their relative low cost, structural strength, durability and simplicity of implementation.

Different CB percentages and concrete compositions were tested in order to determine the most favourable piezoresistive response for the mixture. Measurement setup was optimized towards traffic monitoring requirements. Quasi-static and dynamic compressive load cycles showed very good gauge factors and a response linearity inaffected by temperature variations, despite registered reductions in sensitivity. Overall, results demonstrated that embedding conductive CB-based concrete elements in pavement surfaces may become a prospective alternative to conventional traffic monitoring solutions given their numerous advantages.

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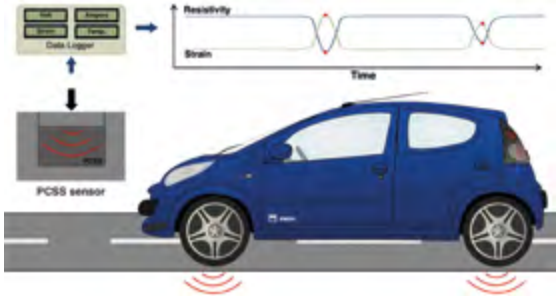
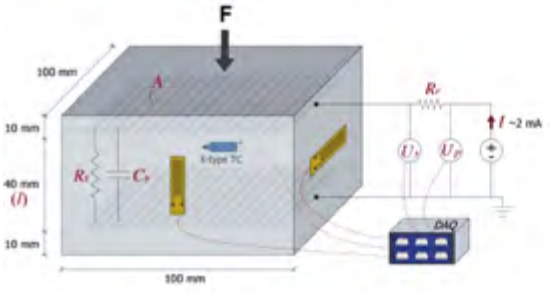
2 — Laboratory for Carbon Nanostructures, KAUST, Saudi Arabia
3 — Faculty of Civil Engineering, RWTH Aachen, Germany

FIGURE 1
Working principle of the Piezoresistive Cement-based Self-Sensor (PCSS).

FIGURE 2
Scheme of the piezoresistivity concrete sensor.





$$\rho_s(t) = \frac{U_s(t)}{I(t)}\frac{A}{l} \quad \Rightarrow \quad FCR = \frac{\Delta\rho_s}{\rho_s} \approx \frac{\Delta R_s}{R_s} = \frac{R_s(t) - R_s(t_0)}{R_s(t_0)}, \text{with } R_s(t) = R_r \frac{U_s(t)}{U_p(t) - U_s(t)}$$

Deployment of Parabolic Trough Concentrated Solar Power Plants in North Africa – a Case Study for Libya

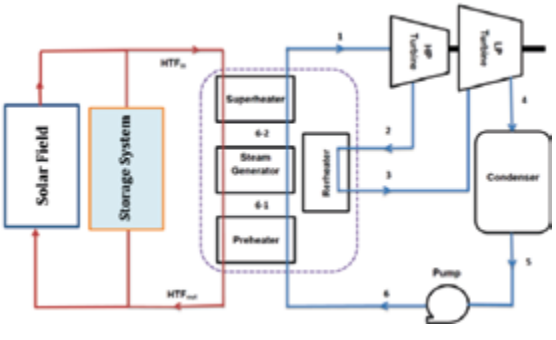
Ismael A.S. Ehtiwesh[1], Fernando Neto da Silva[1], Antonio C.M. Sousa[1]

1 — Department of Mechanical Engineering & TEMA, University of Aveiro

The study addresses the potential of using the parabolic trough concentrated solar power plant (CSP) as an alternative for clean energy generation in the Libyan Mediterranean coast. Impact of project financing and incentives were taken into consideration on the cost of energy. The primary finding of the study is that the CSP plant located in Tripoli (Libya) region, which was selected due to its high direct normal irradiation (DNI) and the absence of sandstorms, presents superior performance and potentially lower levelized cost of electricity ($0.18/kWh versus $0.22/kWh), as compared to that in Almeria (Spain). Also, the Tripoli plant takes a slight edge (2-3%) in terms of overall efficiency.

The dual-purpose of implementing CSP technology in Libya is: 1) sales to Europe of the produced electricity supplied through subsea transmission lines; and 2) regional economic and social development resulting from: a) construction work and locally manufactured components; b) operation and maintenance using regional workforce; and c) partial use of the power generated for local projects leading to diversification of the economy.

FIGURE 1
Schematic of the present study CSP.

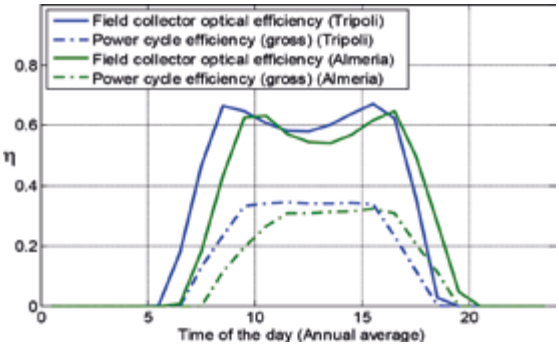


The CSP [1] located in Tripoli has the same configuration and size (50 MWe) of that in Almeria; it consists of an array of mirrors that tracks sun irradiation and reflects it into a receiver, where the concentrated energy is used to heat up the heat transfer fluid (HTF) that enters the steam generator (Fig. 1).

The study is supported by two main models: 1) mathematical model to determine the HTF energy and exergy balance for each plant component, and 2) model, based on SAM [2], to analyze the behavior and performance of the components through an hourly analysis on an annual basis. The first model also has the capability of conducting a detailed thermoeconomic analysis to determine the cost rate of exergy destruction. Figure 2 reports the annual efficiency profile of the collector field and power cycle for the two sites. The CSP at the Tripoli location presents higher efficiency than that in Almeria mainly due to its higher DNI.

The combined models provide a powerful tool for preliminary design, evaluation of performance and feasibility of CSPs.

FIGURE 2
Annual solar field and power cycle efficiency for the Tripoli and Almeria sites.



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Reductive nanometric patterning of graphene oxide paper using electron beam lithography

Gil Gonçalves[1], Jérôme Borme[2], Igor Bdkin[1], Ankor González-Mayorga[3], Gonzalo Irurueta[1], Helena I.S. Nogueira[4], María C. Serrano[5,6,7], Pedro Alpuim[2,6,8], Paula A.A.P. Marques[1]

This work reports for the first time the development of self-sustained graphene oxide (GO) paper where direct-write Electron Beam Lithography (EBL) was used to create conductive patterns ranging from nano to micro-scale. The GO paper prepared by self-assembly of GO sheets was reduced according to a free pattern chosen to be a series of parallel lines (Figure 1), using different electron doses and beam step sizes in order to effectively obtain a reduced pattern at the GO paper surface.

A meticulous discussion of the characterization results of the GO patterned paper obtained for the different working conditions is presented. Structural analysis of the patterned paper showed that the interlayer distance between GO sheets decreases after reduction, allowing to increase the Hardness and Young modulus, which enables the manipulation and integration of this material on different devices. Furthermore, we also observed that exposed areas to electron beam reduction process showed an increase in the electrical conductivity of up to 3×104 times. This freestanding patterned GO paper may find interesting applications for biosensing applications or 2D template for tissue engineering. The preliminary biological tests performed on this work confirmed the biocompatible nature of the patterned GO paper for future research on the biomedical field.

Reference

Reductive nanometric patterning of graphene oxide paper using electron beam lithography, Carbon, Vol 129, April 2018, Pages 63-75.

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6 — Materials Science Factory, ICMM-CSIC, Madrid, Spain
7 — Joint Research Unit "Design and Development of Biomaterials for Neural Regeneration", HNP-SESCAM, Joint Research Unit with CSIC, Spain
8 — CFUM-Center of Physics of the University of Minho

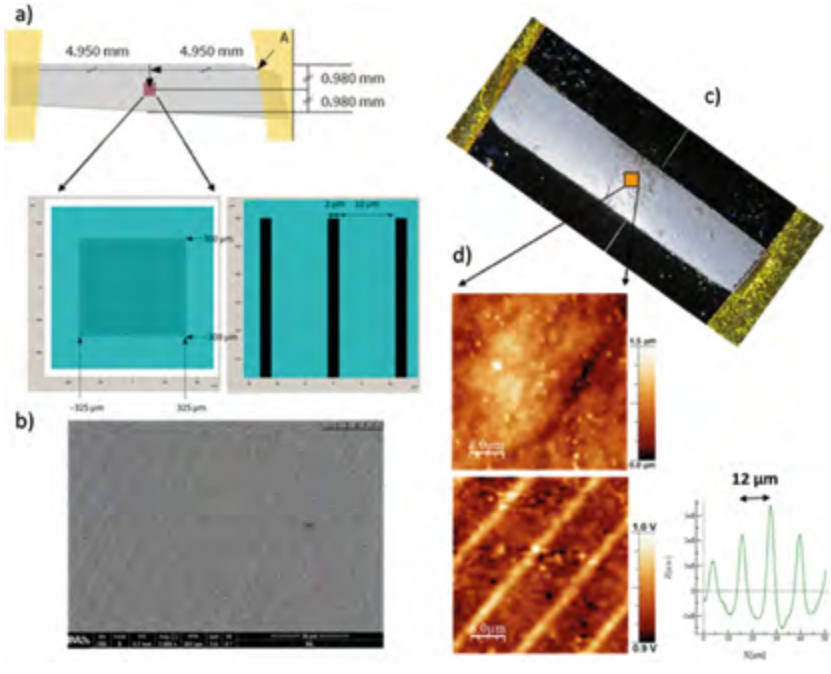

FIGURE 1

a) Schematic representation of the patterned performed on the surface of the GO paper by EBL.
b) SEM image of patterned GO paper.
c) Optical photograph of the exposed area on a strip of the GO paper sample.
d) Atomic force microscopy measurements of the surface potential of the patterned GO paper, showing the predefined center-to-center distance between the reduced lines of 12 µm.

Mind the snake: Fear detection relies on low spatial frequencies

Nuno Gomes[1], Sandra C. Soares[2,3,4], Samuel Silva[5], Carlos F. Silva[2,3]

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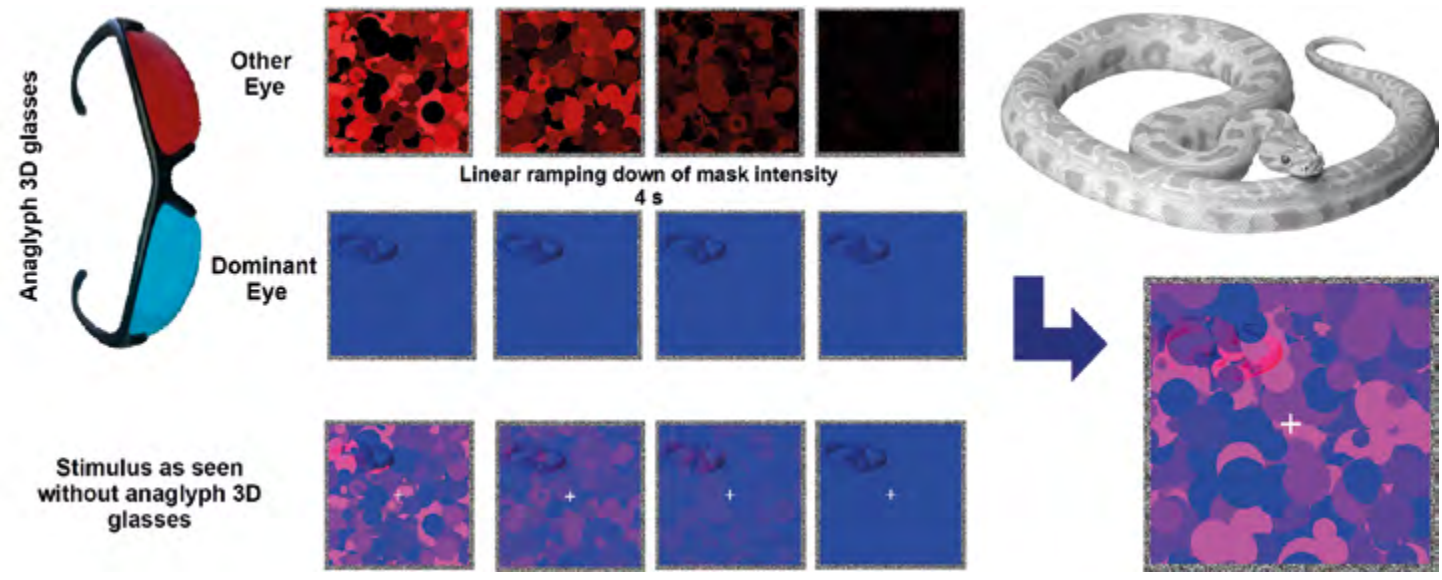
2 — Department of Education and Psychology & William James Center for Research, University of Aveiro
3 — Department of Education and Psychology & CINTESIS, University of Aveiro
4 — Department of Clinical Neuroscience, Division for Psychology, Karolinska Institutet, Sweden
5 — Department of Electronics, Telecommunication and Informatics & IEETA, University of Aveiro

The privileged processing of threat stimuli, even in the absence of visual awareness, has been associated with a subcortical superior colliculus (SC) – pulvinar pathway to the amygdala, bypassing the visual cortex. Relying on slower cortical visual activity would have dire consequences, with the subcortical visual system functioning, instead, as a rapid detector and first responder when time is of the essence. Although this notion is supported by a large bulk of studies with both non-human primates and humans, other research, using social stimuli (fearful faces), has shown evidence that cortical processing may not be ruled out from this fast-initial processing of threat-related stimuli. In the current study, we used an approach based on the tuning properties of cells in the different visual structures, while manipulating the spatial frequency of the stimuli and testing whether the advantage of snakes – a prototypical threat-inducing stimuli – in accessing visual awareness relies on high or low spatial frequencies (i.e., fine or coarse visual details, respectively). To that effect, we used an interocular suppression paradigm – Continuous Flash Suppression (CFS) – , and recorded the time needed for stimuli showing three different levels of spatial frequency information – broad (unfiltered), low, and high spatial frequencies, to break the suppression caused by the CFS (breaking-CFS). Our results showed a snake advantage (compared to bird control stimuli) in accessing visual awareness only for low spatial frequencies, which argues in favor of the role of a subcortical pathway (superior colliculus – pulvinar) to the amygdala in threat detection, thought to be sensitive to coarse, but not to fine detailed information. Our research work also highlights that social and predatory fear stimuli may have distinctive neuronal signatures, given their different biological relevance.




6

QUICK FACTS AND STATS

People

FACULTY BY DEPARTMENT / SCHOOL

	FACULTY (FTE)			
	TOTAL	TOTAL	PERCENTAGE OF WOMEN	PERCENTAGE OF FOREIGNERS
UNIVERSITY	**2017**	**2018**		
Department of Biology	33,8	34,9	44%	
Department of Chemistry	44,3	44,3	53%	
Department of Civil Engineering	15,35	15,4	21%	
Department of Communication and Art	74,4	75,3	31%	4%
Department of Economics, Management, Industrial Engineering and Tourism	52,2	53,4	62%	4%
Department of Education and Psychology	37,8	40,6	69%	2%
Department of Electronics, Telecommunications and Informatics	76	77	8%	
Department of Environment and Planning	17	16	63%	
Department of Geosciences	13,3	14,3	42%	
Department of Languages and Cultures	42,6	43,3	63%	21%
Department of Materials and Ceramics Engineering	15	16	44%	
Department of Mathematics	56,6	56,7	47%	9%
Department of Mechanical Engineering	26,3	26,2	9%	
Department of Medical Sciences	19,8	23,9	66%	10%
Department of Physics	44,3	43,3	18%	7%
Department of Social Sciences, Political and Territorial Sciences	21,3	19,7	26%	
POLYTECHNIC SCHOOLS				
Águeda School of Technology and Management	55	58,3	44%	1%
Aveiro Institute of Accounting and Administration	64,7	68,6	52%	
Health School	43,1	49,3	65%	
School of Design, Management and Production Technologies	25,9	30,9	33%	
TOTAL	**778,75**	**807,4**	**43%**	**3%**

RESEARCHERS BY DEPARTMENT / SCHOOL

	RESEARCHERS (FTE)			
DEPARTMENT	TOTAL	TOTAL	PERCENTAGE OF WOMEN	PERCENTAGE OF FOREIGNERS
UNIVERSITY	**2017**	**2018**		
Department of Biology	90	97	69%	15%
Department of Chemistry	130,5	134	60%	22%
Department of Civil Engineering	3	2	100%	
Department of Communication and Art	8	16	44%	31%
Department of Economics, Management, Industrial Engineering and Tourism	3	2	50%	
Department of Education and Psychology	19	13	92%	
Department of Electronics, Telecommunications and Informatics	24	23	39%	26%
Department of Environment and Planning	33	37	65%	30%
Department of Geosciences	9	5	60%	
Department of Medical Sciences	11	12	67%	8%
Department of Materials and Ceramics Engineering	37,3	38	37%	39%
Department of Mathematics	7	6	50%	33%
Department of Mechanical Engineering	32,4	28	39%	54%
Department of Physics	75	72	28%	38%
Department of Social Sciences, Political and Territorial Sciences	19	17	65%	18%
School of Design, Management and Production Technologies	2	1	100%	100%
TOTAL	**503,2**	**503**	**55%**	**26%**

STAFF BY CATEGORY

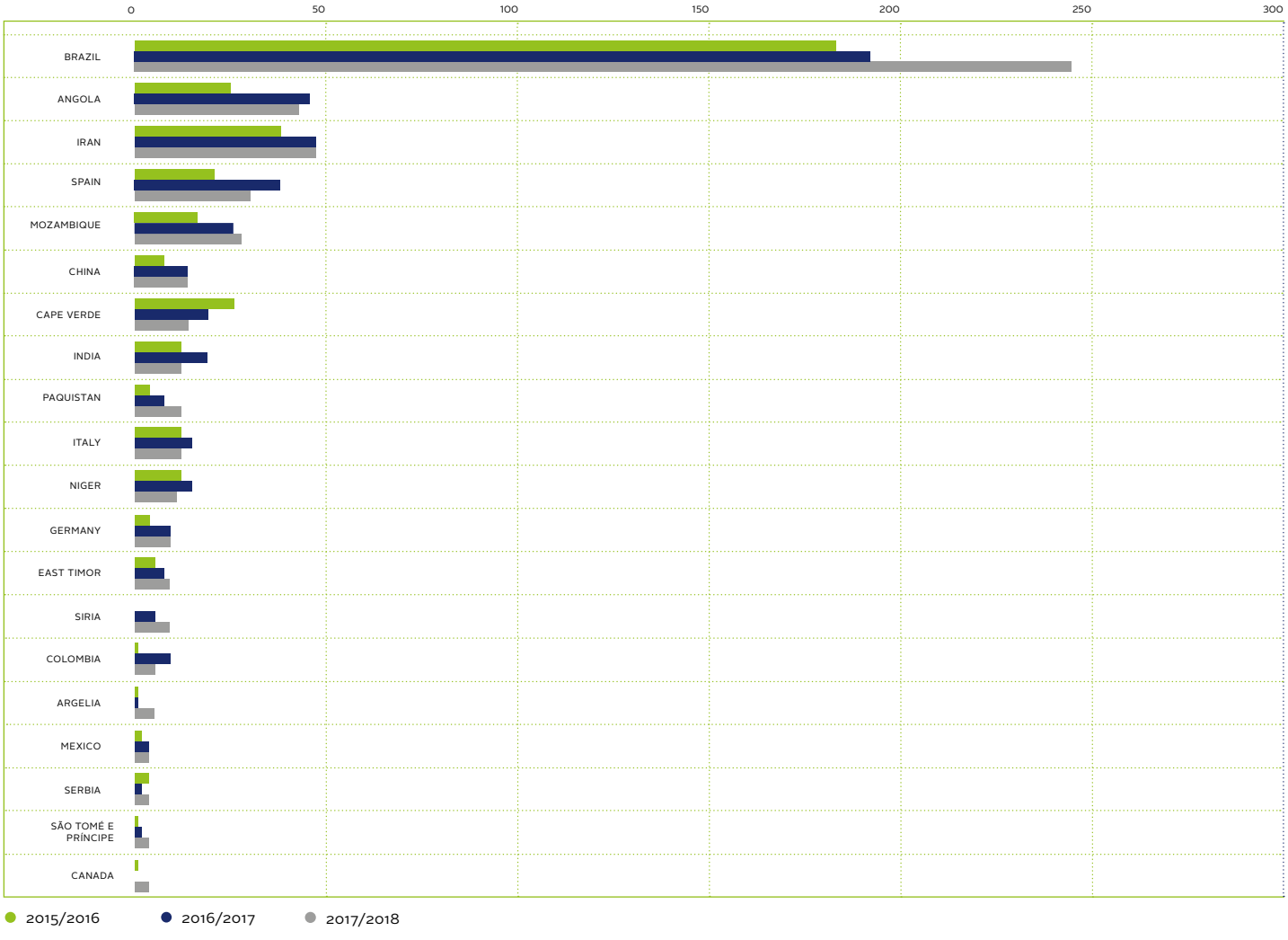
		FACULTY (FTE)		
CATEGORY	**2017**	**2018**		
UNIVERSITY	**TOTAL**	**TOTAL**	**PERCENTAGE OF WOMEN**	**PERCENTAGE OF FOREIGNERS**
Full professors	54,5	59,6	13%	4%
Associated professors	121	124	38%	3%
Assistant professors	378,4	381,7	45%	3%
Lecturers	19,55	17,75	21%	
Other teaching staff	16,6	17,3	71%	42%
Researchers	120,2	152	49%	24%
Post-doctoral students	383	351	57%	27%
POLYTECHNIC SCHOOLS				
Coordinator professors	12,9	14,9	34%	
Adjunt professors	125,4	140,05	51%	
Lecturer	50,4	52,1	52%	1%
TOTAL	**1281,95**	**1310,4**	**47%**	**12%**

PhD STUDENTS BY DEPARTMENT

		PhD STUDENTS			
UNIVERSITY	**TOTAL**	**TOTAL**	**PERCENTAGE OF WOMEN**	**PERCENTAGE OF FOREIGNERS**	**PERCENTAGE OF NEW STUDENTS**
DEPARTMENT	**2016/2017**	**2017/2018**			
Department of Biology	173	161	65%	27%	18%
Department of Chemistry	122	122	70%	13%	23%
Department of Civil Engineering	50	64	17%	52%	28%
Department of Communication and Art	242	229	48%	49%	24%
Department of Economics, Management, Industrial Engineering and Tourism	178	230	43%	46%	43%
Department of Education and Psychology	244	243	70%	38%	26%
Department of Electronics, Telecommunications and Informatics	100	101	21%	29%	32%
Department of Environment and Planning	83	71	42%	42%	17%
Department of Geosciences	8	12	67%	33%	33%
Department of Languages and Cultures	50	60	73%	37%	42%
Department of Materials and Ceramics Engineering	75	78	37%	36%	28%
Department of Mathematics	22	23	61%	26%	26%
Department of Mechanical Engineering	65	59	27%	32%	39%
Department of Medical Sciences	48	64	66%	6%	44%
Department of Physics	91	76	32%	12%	21%
Department of Social Sciences, Political and Territorial Sciences	62	78	41%	49%	45%
TOTAL*	**1377**	**1443**	**52%**	**35%**	**30%**

* The students of joint doctoral studies are considered in each participating department. Therefore, the students count by department is superior to the total.

FOREIGN PhD STUDENTS BY NATIONALITY



MSc and PhD theses

FOREIGN PhD STUDENTS BY CONTINENT

- Europe (11%)
- Africa (20%)
- Asia (17%)
- America (52%)

MSc THESES IN 2018 PER AREA

- Arts and Humanities (16%)
- Social Sciences (18%)
- Exact Sciences (3%)
- Health Sciences (6%)
- Life Sciences (16%)
- Engineering and Technology (41%)

PhD THESES IN 2018 PER AREA

- Arts and Humanities (9%)
- Social Sciences (22%)
- Exact Sciences (8%)
- Health Sciences (4%)
- Life Sciences (22%)
- Engineering and Technology (35%)

Sci Papers

TOP 10 SUBJECT AREAS FOR PAPERS PUBLISHED IN 2017	RECORD COUNT	% OF 2143
Environmental Sciences	268	12.51%
Materials Science Multidisciplinary	169	7.89%
Engineering Electrical Electronic	124	5.79%
Chemistry Physical	117	5.46%
Chemistry Multidisciplinary	98	4.57%
Physics Applied	96	4.48%
Telecommunications	78	3.64%
Mathematics Applied	71	3.31%
Optics	71	3.31%
Education Educational Research	70	3.27%

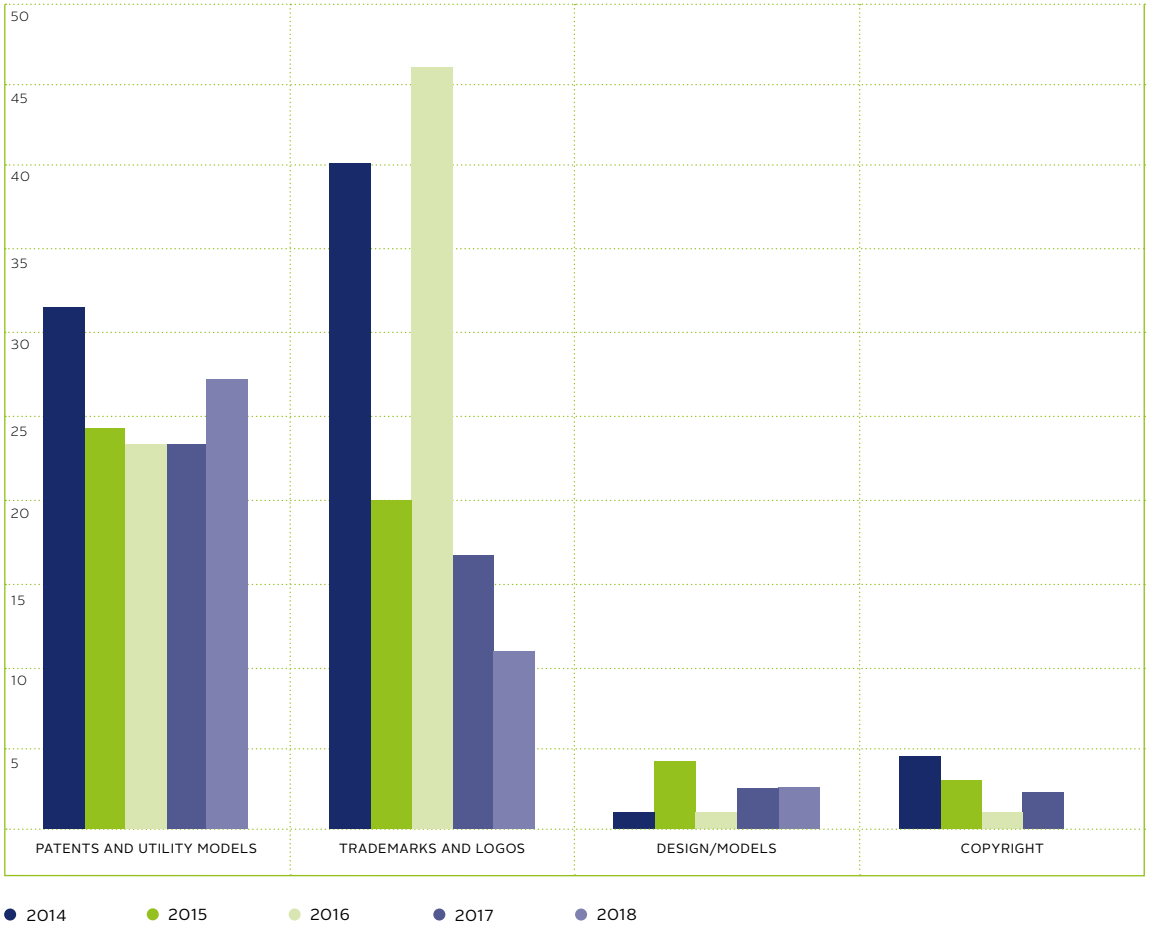
Data retrieved from Web of Science (Clarivate Analytics) in 3 June 2019

TOP 10 CITED PAPERS	TOTAL Nº CITATIONS (2013 – 2018)
Klionsky, DJ; Abdelmohsen, K; Abe, A; Abedin, MJ; Abeliovich, H; Arozena, AA; et al (2016). Guidelines for the use and interpretation of assays for monitoring autophagy (3rd edition). AUTOPHAGY, 12: 1-222	1529
Berti, E; Barausse, E; Cardoso, V; Gualtieri, L; Pani, P; Sperhake, U; et al (2015). Testing general relativity with present and future astrophysical observations. CLASSICAL AND QUANTUM GRAVITY, 32, Article Number: 243001	318
Herdeiro, CAR; Radu, E (2014). Kerr Black Holes with Scalar Hair. PHYSICAL REVIEW LETTERS, 112 Article Number: 221101	266
Silva, P; Vilela, SMF; Tome, JPC; Paz, FAA (2015). Multifunctional metal-organic frameworks: from academia to industrial applications. CHEMICAL SOCIETY REVIEWS, 44: 6774-6803	259
Vilela, C; Sousa, AF; Fonseca, AC; Serra, AC; Coelho, JFJ; Freire, CSR; et al (2014). The quest for sustainable polyesters – insights into the future. POLYMER CHEMISTRY, 5: 3119-3141	205
Herdeiro, CAR; Radu, E (2015). Asymptotically flat black holes with scalar hair: A review. INTERNATIONAL JOURNAL OF MODERN PHYSICS, 24 Article Number: 1542014	163
Kalaji, HM; Schansker, G; Ladle, RJ.; et al (2014). Frequently asked questions about in vivo chlorophyll fluorescence: practical issues. PHOTOSYNTHESIS RESEARCH, 122: 121-158	151
Sousa, AF; Vilela, C; Fonseca, AC; et al. (2015). Biobased polyesters and other polymers from 2,5-furandicarboxylic acid: a tribute to furan excellency. POLYMER CHEMISTRY, 6: 5961-5983	144
Bennett, EM; Cramer, W; Begossi, A; et al (2015). Linking biodiversity, ecosystem services, and human well-being: three challenges for designing research for sustainability. CURRENT OPINION IN ENVIRONMENTAL SUSTAINABILITY, 14: 76-85	133
Ferreira, SS; Passos, CP; Madureira, P; et al (2015). Structure function relationships of immunostimulatory polysaccharides: A review. CARBOHYDRATE POLYMERS, 132: 378-396	124

Intellectual Property

INTELLECTUAL PROPERTY RIGHTS REGISTRATION

	2014	2015	2016	2017	2018
Patents and Utility Models	32	24	23	23	27
Trademarks and Logos	40	20	46	17	11
Design/Models	1	4	1	2	2
Copyright	4	3	2	2	0



International Projects

EU-FUNDED PROJECTS STARTED IN 2018

HORIZON 2020 – PROJECTS COORDINATED BY UA	ACRONYM	PROJECT COORDINATOR
Nanoparticles – based 2D thermal bioimaging technologies	NanoTBTech	LUÍS CARLOS
Physical principles of the creation of novel SPINtronic materials on the base of Multilayered metal – oxide Films for magnetic sensors MRAM	SPINMULTIFILM	NIKOLAI SOBOLEV

HORIZON 2020 – MONOBENEFICIARY PROJECTS	ACRONYM	PROJECT COORDINATOR
Novel 3D platforms to engineer bone microtissues for in vitro disease models	Microbone	JOÃO MANO
Pine protection against Pitch canker through genetic resistance and plant immunization	PLIMPINE	GLÓRIA PINTO
Smart anticorrosion coatings based on nanocontainers loaded with novel, eco-friendl cationic gemini surfactants as efficient corrosion inhibitors for carbon steel in seawater	EcoGEmCoat	JOÃO TEDIM

HORIZON 2020	ACRONYM	LOCAL COORDINATOR
Additive Manufacturing of 3D Microfluidic MEMS for Lab-on-a-Chip applications	M3DLoC	ALEXANDER TSELEV
Preserving and sustainably governing Cultural heritag and Landscapes in European coastal and maritime regions	PERICLES	CRISTINA PITA
Challenging Gender (In)Equality in Science and Research	CHANGE	TERESA CARVALHO
Project Ô: demonstration of planning and technology tools for circular, integrated and symbiotic use of water	PROJETO Ô	TERESA FIDÉLIS
Electronic Health Data in a European Network	EHDEN	JOSÉ LUIS OLIVEIRA

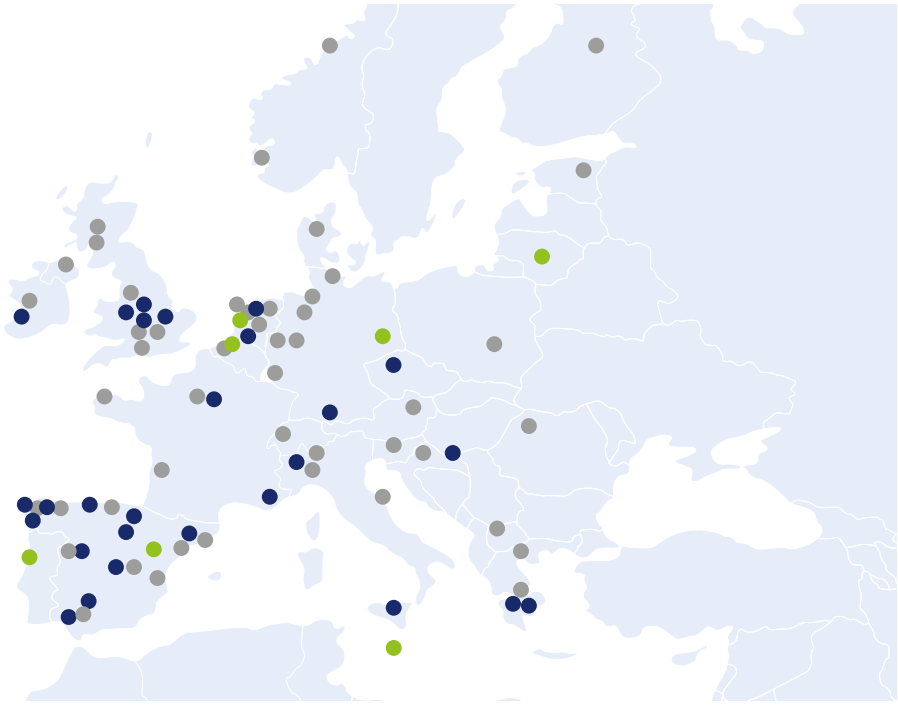
URBAN INNOVATIVE ACTIONS	ACRONYM	LOCAL COORDINATOR
Urban Network for Upgrading STEAM Skills and Increasing Jobs Added-Value through Digital Transformation in a new economic context	Aveiro STEAM CITY	MARLENE AMORIM

LIFE +	ACRONYM	LOCAL COORDINATOR
Erosion prevention and flora REstauration of burn FOREST areas through innovative fungal-technosol solution	LIFE REFOREST	JAN JACOB KEIZER

ERASMUS +	ACRONYM	LOCAL COORDINATOR
Social Innovation for Knowledge Exchange	SIKE	GONÇALO GOMES
CONDUCTIT	CONDUCTIT	ANTÓNIO V. LOURENÇO
Language Learning Online in the age of Mobility	LLOM	ANTÓNIO MOREIRA
Building Links between education, research and innovation on the foundation of our shared cultural heritage	CRAFT	FÁTIMA POMBO
Fostering Acessible Study Technologies (FAST): Accessible Learning Management System in Humanities and Social Sciences	FAST	GONÇALO PAIVA DIAS
MIND Safety – safety matters II	MS-SM II	FERNANDA RODRIGUES

INTERREG SUDOE	ACRONYM	LOCAL COORDINATOR
Joint Strategy for the Protection and Restoration of Ecosystems Affected by Forest Fires (Integrated management in high-risk natural areas)	EPYRIS	JAN JACOB KEIZER
LightER, eco-friendliER and SafER COMposite PRESSure tanks	COMPRESSER	HUGO FARIA
Mapping, consolidation and dissemination of Key Enabling Technologies (KET's) for the construction sector in the SUDOE Space	SUDOKET	VICTOR FERREIRA

NETWORK OF EUROPEAN UNIVERSITIES AND COMPANIES WORKING WITH UA IN EU PROJECTS STARTED IN 2018



AUSTRIA (LLOM)
BELGIUM (SPINMULTIFILM, M3DLOC, MININGIMPACT2)
CROACIA (SIKE, PROJECT Ô)
CZECH REPUBLIC (EHDEN)
DENMARK (CRAFT, PERICLES, PROJECT Ô)
ESTONIA (EHDEN)
FINLAND (LLOM)
FRANCE (LLOM, M3DLOC, PERICLES, PROJECT Ô, COMPRESSER, SUDOKET)
GERMANY (SIKE, SPINMULTIFILM, CHANGE, PROJECT Ô, MININGIMPACT2)
GREECE (LLOM, M3DLOC)
IRLAND (M3DLOC)
ITALY (PROJECT Ô, MININGIMPACT2)
LITHUANIA (SPINMULTIFILM)
MACEDONIA (FAST)
MALTA (SMARTAQUA)
NETHERLANDS (MS-SM II, PERICLES, NANOTBTECH, EHDEN, MININGIMPACT2)
NORWAY (CONDUCTIT, MININGIMPACT2)
POLAND (LLOM, MININGIMPACT2)
PORTUGAL (PROJECTS COORDINATED BY UA – NANOTBTECH, SMARTAQUA, SPINMULTIFILM)
SLOVAKIA (CHANGE)
SLOVENIA (CRAFT)
SPAIN (SIKE, LLOM, CRAFT, MS-SM II, LIFE REFOREST, M3DLOC, PROJECT Ô, NANOTBTECH, EHDEN, EPYRIS, COMPRESSER, SUDOKET)
SWITZERLAND (ATMOSPHERIC)
UNITED KINGDOM (SIKE, CONDUCTIT, M3DLOC, PERICLES, PROJECT Ô, EHDEN, MININGIMPACT2)

● Companies ● Universities ● Projects cooordinated by UA

Budget

TOTAL BUDGET OF THE PROJECTS STARTED IN 2018 BY RESEARCH CENTRES AND FUNDING AGENCY*

RESEARCH CENTRE	CCDRC	EUROPEAN UNION	FCT	ANI	AICEP	OTHERS INTERNA-TIONAL	OTHERS NATIONAL	2017	2018
CESAM		868.569	8.943.339			309.195	2.987.352	7.583.737	13.108.455
CIC.DIGITAL			690.759					367.401	690.759
CICECO		1.256.667	9.280.671	1.681.812				6.424.995	12.219.150
CIDMA			773.586					628.225	773.586
CIDTFF		37.436	9.500				36.735	119.802	83.671
CINTESIS			422.460						422.460
CIPES		246.000	217.332					41.308	463.332
CLLC								20.465	
GEOBIOTEC			50.024					72.201	50.024
GOVCOPP		418.414	1.524.761				108.034	1.270.662	2.051.209
I3N		167.900	856.394	167.373				46.068	1.191.667
IBIMED	894.717		2.456.333					4.604.740	3.351.050
ID+		141.790	173.130					74.861	314.920
IEETA		626.250	822.120	180.796				2.103.142	1.629.166
INET-MD		88.421	874.140				7.000		969.561
IT		2.471.780	2.631.825	2.304.905				6.541.048	7.408.510
NOT INTEGRATED**	321.987	1.089.078	210.844	839.072	2.429.751		886.558	12.290.830	5.777.289
QOPNA			2.372.547	230.727				2.512.198	2.603.274
RISCO		219.215	396.580					39.691	615.795
TEMA			2.648.755	1.012.231			64.074	1.862.521	3.725.060
TOTAL	**1.216.704**	**7.631.519**	**35.355.101**	**6.416.917**	**2.429.751**	**309.195**	**4.089.752**	**46.603.897**	**57.448.939**

* Contracts with industry and multiannual budget of research centres not included

** Projects not integrated in research centres

* in Euros

APPROVED BUDGET UNDER EU-FUNDED PROJECTS*

EUROPEAN PROGRAMMES	2017	2018
H2020 – ERC POC		150.000
H2020 – TEAMING	1.001.138	
H2020 – FETOPEN		508.060
H2020 – ITN-ETN	1.133.425	
H2020 – RISE	207.000	167.900
H2020 – IF	356.395	297.271
H2020 – NMBP	188.876	449.971
H2020 – ICT	321.250	1.439.375
H2020 – SC6		198.751
H2020 – SCC	484.900	
H2020 – SPIRE	246.655	
H2020 – BG	597.816	
H2020 – CIRC	419.823	418.414
H2020 – SAWFS		246.000
H2020 – JTI – IMI		626.250
ERASMUS +	368.987	387.849
LIFE+		301.182
INTERREG SUDOE		520.036
INTERREG ATLANTIC AREA	826.759	
URBAN INNOVATIVE ACTIONS		1.920.460
EMFF	267.607	
RFSC	39.691	
TOTAL	**6.460.323**	**7.631.519**

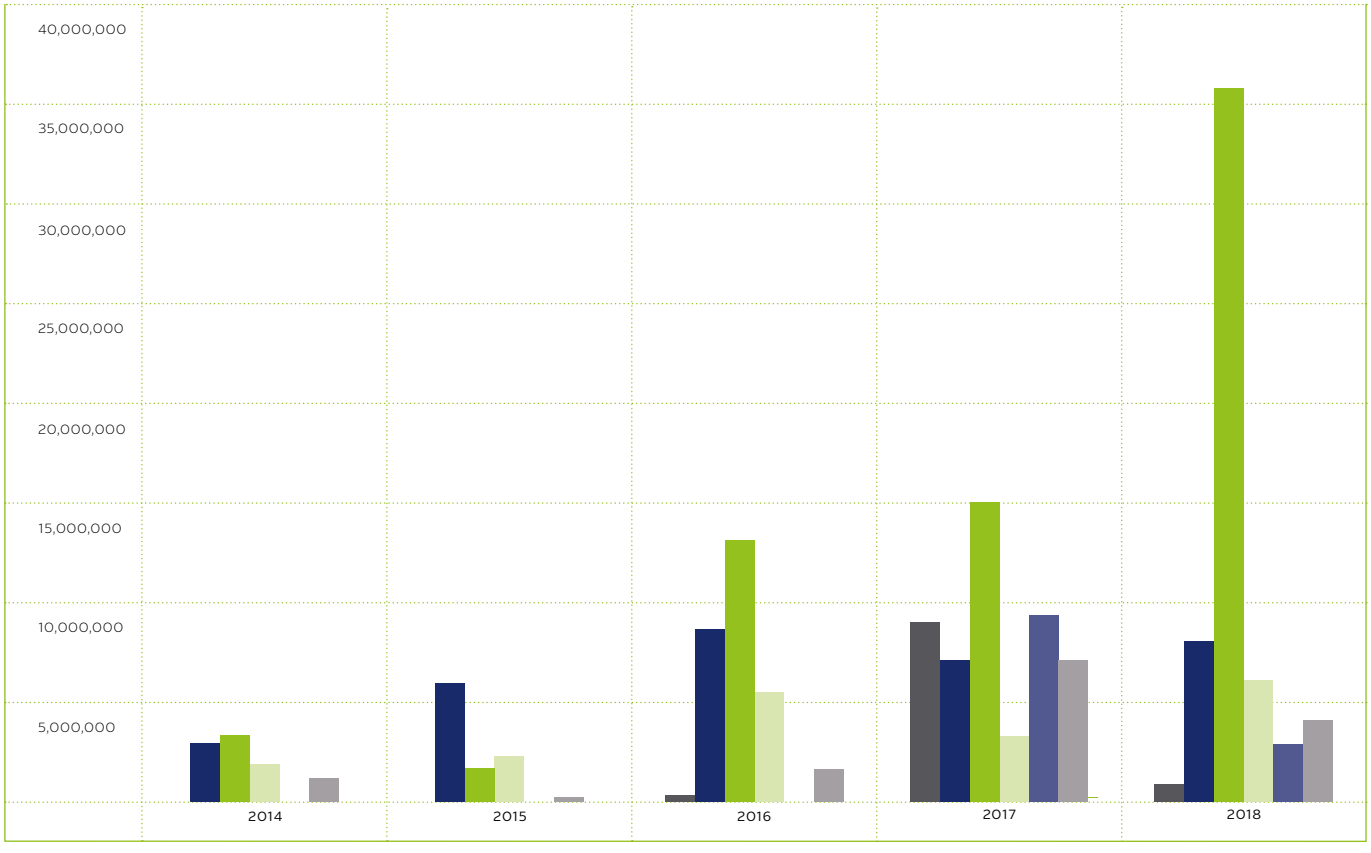
* in Euros

DISTRIBUTION OF RECEIVED FUNDS, BY FUNDING AGENCY*

FCT (57%) Other (7%) CCDRC (5%)
ANI (3%) EU (28%)

* Contracts with industry and multiannual budget of research centres not included

TOTAL BUDGET OF THE PROJECTS STARTED PER YEAR AND FUNDING AGENCY*



CCDRC European Union FCT ANI AICEP Others

* Contracts with industry and multiannual budget of research centres not included


7

RESEARCH SUPPORT

Support for researchers

During 2018, 604 research and technology transfer projects were active in the University of Aveiro, including 14 ERANET or JPI Actions and 126 funded by International and European Programmes, of which 31 by ERASMUS+ and 40 by Horizon 2020. From these 13 are coordinated by UAVR. Among these projects are three ERC Grants, a TWINNING and a TEAMING projects. To achieve these numbers, the work done by the Research Support Office of the University of Aveiro has been fundamental.

The office provides high quality advisory, administrative, technical, contracting and financial services to researchers of all disciplines at the University, assisting the research community in its efforts to secure external funding (national, regional, international; grants, awards and prizes).

Formed by 3 skilled officers with mixed backgrounds, the main action lines of the office are 1) Research development; 2) Strategy support and implementation and 3) Research grants and contracts. The office thus covers most of the life-cycle of projects, working closely with faculty and researchers in order to identify funding opportunities and bring together interdisciplinary groups of researchers with common interests; disseminating funding information, partnership opportunities, as well as training events; supporting and co-ordinating strategic activities/ projects; providing advice on costing and submission of grant applications as well as Uni-versity's authorization for submission; supporting negotiations of contract terms with funders and collaboration agreements with other HEIs and public sector colla-borators; formalizing of contracts and agreements, among other documents.

The office works as the main contact point and interface unit for Research Units and Associated Laboratories, researchers, funding agencies and other relevant stakeholders in the research and innovation ecosystem.

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