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Activity Report 2019-2021

INTERNATIONAL IBERIAN
NANOTECHNOLOGY
LABORATORY

Background

The goal is to give an overview of INL's advances and main achievements between 2019-2021 in an intuitive and informative way.

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Introduction

Foreword

The years of 2019-2021 have been very intensive and we have witnessed large geopolitical consequences - being largely influenced by the Covid pandemics, making these last years in a way, quite different than previous years. Partly as consequences of the pandemic, the giant logistic challenges and the shortage of certain goods became issues and words like semiconductors and chips surfed up in society – and sustainability & resilience became important not only in the political discussion but also in industry.

For the years to come, the launch of the green deal and the digital agenda by the EU Commission will lead to significant enhancements when it comes to the combination of a strong digitalization of society with a connected and increased sustainability focus, highlighting that we are at a tipping point. The consequent needs, for all of us, are evident. We need to walk the talk and change our lifestyles, stop to consume the resources of Earth, and take actions for reducing carbon emission. These developments will immensely transform society.

The large Euro Recovery and Resilience plan contains a multitude of various sustainability initiatives and possibilities for stimulating the economy with immense opportunities for disruptive green innovations based on breakthrough technologies and game changing discoveries that can both scale up Europe´s start-ups and SMEs into a new generation of world leading companies as well as transforming established industry for a greener future. Materials, especially advanced materials, are the backbone and source of prosperity of an industrial society. Particularly, INL has lately been engaged in the important Materials 2030 Manifesto, the associated roadmap, and the launch of the Materials 2030 Initiative – for planet, people and prosperity.

Dialogues between and with various stakeholders are keys for societal development. Science has over and over proven to be an excellent platform for dialogue. Science has no borders, and it unites people.

INL is a research-intense organization. We create knowledge. And we deliver knowledge to the "business" market. The most characteristic features of INL today are a rapid growth, a changing organisation and a strong focus on developing a sustainable business model as well as an international footprint. The last three years, despite the pandemics, have been extremely good and very dynamic. The Clusterisation process have over the years continued with enhanced activities related to innovation and communication plans: We have been very successful when it comes to capturing projects, we have continued to publish high impact research articles and our IP portfolio has increased considerable. The NanoSafety Research, the Engineering support groups and the increased utilization of user facilities at INL have had a great development. Our activities related to Covid-detection led to a successful license deal with a large global company putting our technology in the market. Likewise, our activities and engagement for bringing together actors in the Energy sector was successful. Further, a series of very important activities that took place during 2021 was the successful hosting of several high-level events at INL such as the Green Battery Summit and the large bi-annual EuroNanoForum

Foreword

conference, this time for the first time in history, being fully digital, and consequently allowing thousands of participants to be present and be connected. We became members of EIT KIC InnoEnergy, the BEPA (Batteries European Partnership Association), and HER (Hydrogen Europe Research) associations, among others, and Observer in the WIPO – World Intellectual Property Organization and in the Codex Commission of the Food and Agriculture Organization (FAO). During 2021 we also launched for the first time the INL Research Project Awards and the INL Idea Awards with substantial prizes made possible by a contribution from several Founding (Industrial) Partners from all over the world.

Our work at INL will always be based on our drive, ambition, and eagerness to work for a purpose with a great meaning, larger than our-selves. And provide value to society and be rewarded by the recognition from society. Our single greatest asset is our multi-cultural and inter-disciplinary personnel, our complete laboratory and our ability to recruit the right people and obtain the needed resources. The support from our Council and their kind appreciation of all our activities – and to all of us INLers, has also been highly important and stimulating.

Finally, I am very grateful to all of you INLers for your passion and hard work, making INL to continuously develop and generate new knowledge to the benefit of society. And also, a big Thank You to all our partners and friends worldwide. Your kind efforts and help are immensely valuable.

And let me round up by repeating the INL core values: Committed and Proud!

Enjoy the reading of our tri-annual report 2019-2021.

All the very best

Yours Truly

Lars Montelius, Director-General

INL Governance

Statutes

The **INL Statutes** (2007) anticipate the possibility of opening INL to the membership of other countries and the participation of institutions and experts from all over the world, to establish an international pole of excellence, developing partnerships with higher education institutions and the industry transferring knowledge with added value, generating employment and training specialized professionals.

Organisation

The INL Organisational Model is consolidated and formalized in a set of documents funded on the Statutes and Headquarter Agreement.

The Council is the sovereign body of the INL and is composed of representatives of both Member States. The role of the Council is to govern the Organisation by determining the policies at scientific, technical and administrative levels, approving the programme of activities and the budget, based on proposals of the Director-General.

Two steering committees advise the Director-General: the R&T&I Steering Committee that coordinates, strategies and develops the INL Research, Technology and Innovation activities and promotes the conditions for INL research to be performed at the highest international level and the Corporate Services Steering Committee that supports the development and coordination of Corporate Services activities needed to facilitate a lean and efficient execution of INL core operations.

The Research Office aims to consolidate, assess and articulate the achievements of RTI goals and objectives, helping to place INL with respect to other reputable Research and Technology Organisations, using benchmarked factors, to determine where to go, thus allowing INL to make data-driven decisions. The Research and Technology activities focused on the six clusters – **Advanced Material and Computing, Clean Energy, Food for the Future, Precise Personalised Health Tech, Smart Digital Nano-Systems, Sustainable Environment** – are developed on a complimentary, collaborative and interdisciplinary basis by twenty-four research groups, which vary in size and number of research lines.

The Department of Administration coordinates the Human Resources, Legal Service, and Learning Organisation functions.

The Department of Site Management coordinates the functions of the Estate and Service Management (ESM), Maintenance & Installation (M&I) and Health, Environment & Safety Management (HE&SM).

INL Governance

The Department of Business and Strategic Relations (BSR) handles a set of activities that includes Grant Office, Industry Collaborations, Start-ups and Incubation, Business Development, External Relations.

The Department of IP Exploitation & Knowledge Transfer operates at the intersection of IP, R&D and business activities, focusing on building a balanced IP portfolio and developing and implementing IP strategies with a risk-based approach.

Within the organisational structure of INL, there is also the Coordination & Quality Management Office (CQM), the Corporate Communication & Marketing Office (CCM) and the Information and Communication Systems Office (ICS).

INL Council

The Council is the sovereign body of the INL in which all member states are represented. It is composed of three representatives from each Member State, one of whom must be a scientist.
The role of the Council is to govern the INL by determining its policy in scientific, technical and administrative matters, approving and following up its programme of activities and approving its budget, based on proposals of the Director-General, who is the Chief Executive Officer of the Laboratory and its legal representative, appointed by the Council.

Portuguese Delegation:

Elvira Fortunato
Minister of Science
Vice-Rector for Research Universidade NOVA de Lisboa
Director CENIMAT – Centre for Materials Research
Professor at Materials Science Department, FCT, Universidade NOVA de Lisboa

Helena Pereira (Council President)
President of the Board of Directors of the Portuguese Foundation for Science and Technology ('Fundação para a Ciência e a Tecnologia')

Madalena Alves
Full Professor of Environmental Biotechnology and Bioengineering at the Universidade do Minho.

Spanish Delegation:

Gonzalo Arévalo Nieto (Council Vice President)
Director-General for Research Planning
Ministry of Science and Innovation

Ana Aricha Yanguas
Vice Deputy Director-General for Internationalization of Science and Innovation
Ministry of Science and Innovation

INL Governance

Hernán Ruy Míguez García
President of Materials Science and Technology Area.
State Research Agency.
Ministry of Science and Innovation

Financial Committee
Spain: Guadalupe de Córdoba Lasunción
Secretaría General de Investigación
Ministerio de Ciencia e Innovación

Portugal: Ricardo Miguel Lavado Araujo
Gabinete de Tecnologia

Directorate
Deputy-Director General
Paulo Freitas

Advisory Board
The INL advisory board is the main advisory body to the Council and meets in the days leading up to the Council Sessions.

Members
Yvan Bruynseraede
KU Leuven

Manuel Martín-Lomas
CIC biomaGUNE

Helmuth Möhwald
Max-Planck-Institute of Colloids and Interfaces

Carlos Oliveira
InvestBraga

Mihail C. Roco
National Science Foundation

Francois Rossi
European Commission
Joint Research Centre

Julia Yeomans
The Rudolf Peierls Centre for Theoretical Physics

INL Activity

INL Activity

INL aims to foster the use of nanotechnology to address the grand challenges of today, aligned with the **Sustainable Development Goals** as identified by the United Nations. The Vision of INL is to be a recognised, leading, global, nanotechnology innovation hub. In order to implement this INL 2030 Strategic Vision and the global Mission of "Exploring Interfaces", the scientific driving forces were clustered into six main areas based on identified societal challenges, in order to support an ecosystem of research, technology, and innovation of interdisciplinary nanotechnology applications. These **Research, Technology, and Innovation (RTI) Clusters** are: Precise Personalised HealthTech, Foodture, Clean Energy, Sustainable Environment, SDNS – Smart Digital NanoSystems, and AMC – Advanced Materials and Computing.

The basic unit of research at INL is a **Research Group.** The 25 Research Groups operating in INL vary in sizes and in number of research lines and disciplines within. One of INL's inherent advantages and challenges is in fact the large number of key disciplines represented across these Research Groups.
The RTI Clusters provide the compass directing the research, technology and innovation activities. Each of the six Clusters has a map of competencies and capabilities stemming from the Research Groups. The identified societal challenges and technology trends are evaluated based on these maps and the ideas emerging from the Clusters, in order to define **Strategic RTI Missions** and align INL efforts to these missions. Therefore, the Clusters play a key role in aggregating sufficient critical mass for these disciplines to jointly make a difference and have the disruptive impact that INL is aiming for.

Furthermore, the cluster structure enables INL to identify, surface, and explore the "hidden" strategic research possibilities and opportunities lying at interfaces which require multi-disciplinary expertise. Such interfaces are present not only within each Cluster but also among Clusters.

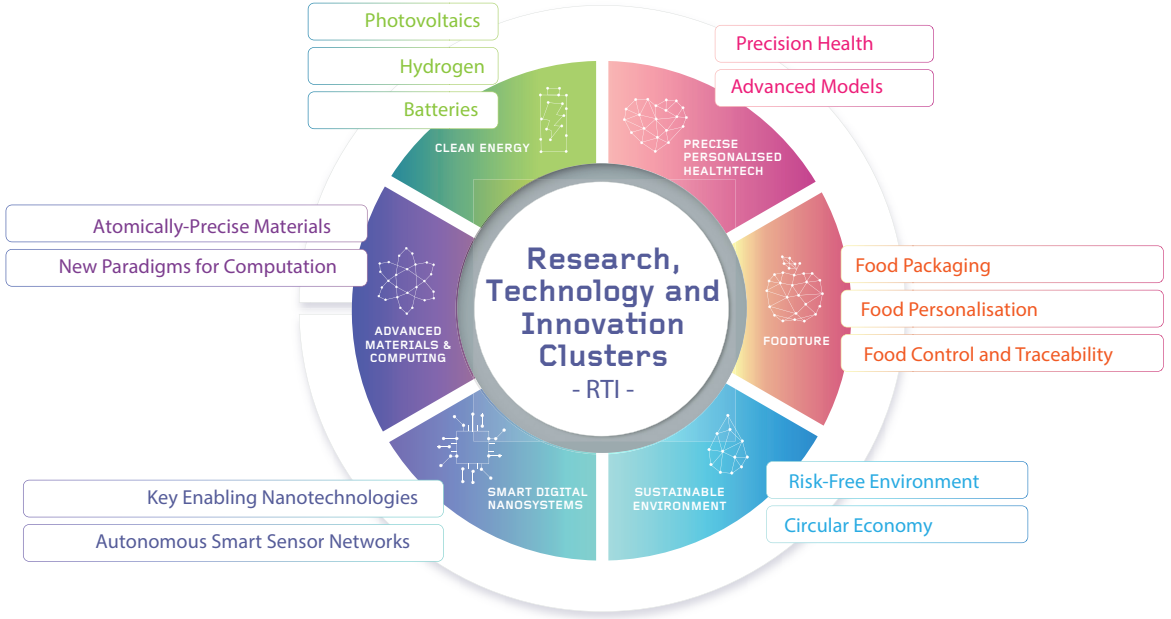

Image 1: INL's six RTI Clusters with the respective Programmes

Brief description of each cluster, including the motivation and drivers:

Precise Personalised HealthTech

The two main health challenges of today´s world's growing population are: the 3 main diseases accounting for EU mortality - these being cancer, cardiovascular, and infectious diseases; and the increase in elderly population based on the increase of overall life expectancy. To address these challenges in society, and based on the highly interdisciplinary teams within health and engineering competences at INL, this cluster explores new health technologies combining both the biological understanding (on diagnostics, therapeutics, theranostics, drug delivery, and biomarkers) with the engineering capabilities (in sensors, microfluidics, fluid mechanics, electronics, nuclear magnetic resonance, integration, photonics, imaging and microscopy). Therefore the aim of this cluster is (a) to contribute to citizens' wellbeing and health using nanobiotechnologies, (b) to engineer new systems/ strategies/devices for early and accurate diagnosis of diseases, (c) to develop new therapeutic approaches for personalized effective treatment of diseases with less side effects, and (d) to promote a cost-effective and accessible healthcare system for all.

Food for the Future

The increase in world population has implications in the food supply and the conventional methods currently used. To address this need, new efficient technologies will need to be developed. Therefore, this cluster aims to apply nanotechnologies for building a future food system that is sustainable and able to secure healthier, tastier, authentic, and safer foods, optimizing and monitoring the processes all throughout the different parts of the whole food value chain. The cluster connects the INL scientific community with IT innovators, financial sector, companies, consumers associations and all the stakeholders throughout the food chain, to promote open innovation to face the future of the food system.

Clean Energy

The most used energy sources today are based on resources that will not be naturally renewed at the pace in which these are currently being consumed. Therefore, there is an urgent need to develop new materials and technologies that will enable society to convert to renewable energy sources. The aim of this cluster is to improve the performance of energy applications while at the same time reducing their cost in order to address the energy challenge, which has an indirect impact on the developments addressing all other societal challenges. This cluster moves towards this aim by attaining an advanced fundamental understanding of micro- and nano-structured energy materials, by developing and designing novel materials for energy applications, and by designing and prototyping new energy devices.

Sustainable Environment

Less than 1% of the water on Earth is non-saline and available for human consumption and UN 2018 last reports concludes that about 6 billion people will suffer from water scarcity by 2050. On the other hand, human activities are increasing pollution of our air and waters, accounting for the most important causes of worldwide mortalities during the year. All together have motivated this cluster to develop programs towards environmental sustainability being the main drivers the implementation of a circular economy and an improved land use both facilitated by digitalisation, and the reduction and/or adaption to the impact of climate change. An overall driver for this cluster is ensuring human safety by reducing the risks associated with environmental contamination, including the potential risks generated with the developed nanosolutions.

SDNS – Smart Digital NanoSystems

A digital society is a reality that exists already and makes part of our daily lives. But the digital transformation is an ongoing process which is far from being finished. New and emerging paradigms like the Internet of Things (IoT), Industry 5.0, Digital Health and Smart Cities rely on an unprecedented convergence between hardware and software that at a physical level is made possible by new disruptive devices (sensors, actuators, nanoelectronic components, photonic components …) and new system architectures (ultra-low power electronics, novel computation paradigms, reconfigurable circuits that take profit of multi-functional devices, …). INL is uniquely suited for the task of exploring and developing this new generation of hardware that will drive, shape and enable the transformation of fundamental aspects of the daily lives of citizens, the transformation towards a more sustainable and efficient industry, novel approaches to environment monitoring and a more personalized healthcare, among many others. INL value proposition towards the development of disruptive ICT enabling hardware technologies results from the convergence of two main assets under the same roof: (a) state-of-the art corporate units that are fundamental to develop and produce these novel devices: a 1000 m2 cleanroom with quick prototyping capability as well as small series production on 200 mm wafers using CMOS-compatible processes, an advanced microscopy facility which includes a set of high-end TEM instruments, a photonics facility, and a new engineering unit that expedites and smoothens the deployment of these technologies into real world applications, and (b) excellent research in nano-science with a strong focus on beyond-CMOS nanotechnologies in fields that include 2D materials, spintronics, photonics, MEMS, as well as combinations of these (and others) in complex hybrid systems. The aim of this cluster is to pursue scientific excellence and explore the outcome of this research developing and deploying full solutions tailored to the needs of external partners.

AMC –Advanced Materials and Computing

INL has an excellent science base which can be turned into a competitive advantage towards emerging technologies, having collaborations between advanced multi-disciplinary science and cutting-edge engineering. The overall aim of this cluster is to reach beyond the forefront of knowledge by highly exploratory research, focusing on areas where INL has the suited facilities, knowledge, and ecosystems developed for exploratory research, exploring novel properties, both experimentally and theoretically, of new low-dimensional and bio-inspired materials as well as combinations and structures of materials paving the way to: (1) design and study new instrumentation and methods enabling novel material/structure tailored with atomic precision, (2) explore new paradigms in computing technologies, such as neuromorphic computing based on spintronic devices and/or brain-inspired photonics, and quantum computing based on photon Qubits, (3) develop quantum technologies for quantum sensing, -imaging, –medicine, and new materials and surfaces exhibiting non-trivial electronic or plasmonic properties, providing disruptive technology toolsets for the future.

RTI Programmes

Clusters play a key role in aggregating sufficient critical mass for various disciplines to jointly make a difference and have the disruptive impact that INL is aiming for. They focus on the fourteen programs described below. These programs, or missions, are in alignment with the strategic research agenda of our research groups, with support from key co-operative teams: the Business Strategic Relations (BSR), the Corporate Communication and Marketing (CCM), the IP Exploitation & Knowledge Transfer (IP&KT), the Corporate Lab Facilities, and the RTI Office. The Missions are:

Precision Health:

Develop nano-enabled medical technologies that allow prevention, earlier diagnosis and personalised treatment of diseases with less side effects for sustainable precision medicine. The new technologies must show at least an improved performance of 25% over existing solutions in preclinical testing.

Advanced Models:

Engineer smart multifunctional advanced disease models and organ-on-a-chip systems for the evaluation of disease biomarkers and therapy testing for the pharmaceutical industry. The new models must mimic the in vivo functions in 3D co-cultures, and allow **multi-omics** evaluation.

Photovoltaics | Batteries | Hydrogen:

Develop solutions for low-carbon renewable and recyclable energy technologies that incorporate nanomaterials and micro/nanofabrication, to enhance their performance, cost-effectiveness, sustainability, stability, and/or breadth of applications. Solutions provided will range from proof-of-concept up to prototype devices for **energy conversion** (photovoltaics and hydrogen technologies), and **energy storage** (rechargeable batteries and hydrogen).

Risk-free Environment:

Enable a risk-free environment by developing and deploying integrated and digital-based solutions for a comprehensive monitoring and selective elimination of air and water pollutants. These solutions will impact on the management of critical resources, and on the mitigation of risks associated with harmful events related to **pollution**, global market, and climate change effects.

Circular Economy:

Promote climate neutrality by facilitating a circular economy with nano-enabled solutions that will help to increase in 10% the recycling of raw materials and in 30% the reuse of wastewater in irrigation, industry and households significantly helping to alleviate the water scarcity in countries with moderate to high levels of water stress.

Food Packaging:

Figure out a high-performance food packaging solution, 100% biodegradable, able to communicate with consumers. The solution will be 50% more efficient **extending the shelf-life** and **reducing food** wastes than the current systems based on petrol.

Food Personalisation:

Develop a set of technologies to engineer the bioactivity and structure of food ingredients to produce functional foods fully personalized. The solution aims to reach one out of ten targeted people by 2030.

Food Control and Traceability:

Develop miniaturized, faster and yet reliable analytical tools that will allow analysis for safety, authenticity and quality to be used by all the actors along the food value chain reducing the time of analysis from days to hours. By 2030, 8 to 10 analytical applications will be complete and qualified in operational environment.

Atomically Precise Materials:

Understand low-dimensional materials, 1D and 2D van der Waals heterostructures, and point defects, assembling them with atomic-scale precision. Explore their **electronic, optical, and magnetic quantum properties** in the development of at least three prototype proof-of-concept devices for applications, e.g., in memory storage and sensing. Use designs (can be bio-inspired) that enable quantum-enhanced, **better-than-classical** performance.

New Paradigms for Computing:

Develop next-generation computational technologies: neuromorphic and quantum computation. Demonstrate components for neuromorphic devices. Demonstrate single-electron qubits and integrated photonic chips for quantum computation. The capabilities developed should be scalable, and enable energy-efficient devices with performance of sub-pico Joule per operation. Develop new algorithms for quantum simulation, computation and resource benchmarking, demonstrating them on real quantum computers and devices.

Key Enabling Nanotechnologies:

Develop a set of technologies exploring fundamental mechanisms that exist at the nanoscale with promising functional properties to address a large variety of societal challenges: Graphene, MEMS, Photonics, and Spintronics. The aim is to establish a research agenda and a development roadmap for the core set of technologies relevant for the next generation of **information and communication technologies:** this includes measuring, transmitting, receiving, transporting, and processing data at high-speeds and power consumption significantly beyond current state of the art.

Autonomous Smart Sensor Networks & System-Level Integration:

Develop until 2030 a modular technology platform that enables the production of wireless and autonomous sensor networks that are capable to operate in a multitude of environments over a large scale range: inside the body, as wearables, within machines, monitoring large infrastructures and disperse over large geographical areas.
Such sensors must be installed in a minimum invasive way (integrated, no cables), capable of operating with virtually no maintenance costs over 10 years and with minimal environmental impact (no replaceable batteries), measuring physical quantities (pressure, temperature, magnetic fields, etc) with **specs beyond state-of-the-art** (lower noise level, higher resolution) at a minimum measurement rate of at least 1 measurement/minute relying 100% on the energy harvested from the environment where they are inserted.
These developed missions interrelate with each other to address the four main RTI Institutional Goals of INL, which are:

Foster a Digital Society enabled by Nanotechnology:
Nanodevices for improved monitoring, control, and safety

Promote Carbon Neutrality and Environment Sustainability:
Enabled by nanotechnology solutions to achieve clean energy supply, waste reduction and recycling.

Develop next-generation Disruptive Computational Technologies:
Neuromorphic and quantum computation

Personalisation of Foods and Medical Nanotechnologies:
For a better health and wellbeing.

INL Research and Engineering Groups

Atomic Manipulation for Quantum Nanotechnology

Group leader:
Zhongchang Wang

The Atomic Manipulation for Quantum Nanotechnology (AMQN) group is dedicated to creating novel two-dimensional materials and nanomaterials for the state-of-the-art magnetic, electronic, optoelectronic, electrochemical and energy applications. The group focuses on probing the structure-property interplay of low-dimensional material systems at the atomic scale so as to fulfill atomic manipulation of quantum nanostructures by combining (scanning) transmission electron microscopy, spectroscopy, first-principles calculations and property assessment. Scientifically, special attention is given to a range of defects and interfaces in 2D materials and nanomaterials and how they mediate material property shifts at the atomic scale, aiming at tackling fundamental material issues in a broad range of functional material systems. By atomistic design based on first-principles calculations, the group aims to develop new functional material systems by a series of preparation methods, e.g. chemical vapor deposition, chemical vapor transport, molecular beam epitaxy, and apply them to fabricate advanced electronic, optoelectronic, and energy devices.

Research lines:

- Development of ferroelectric and ferromagnetic 2D materials
- Development of prototype information storage devices and integrated chips at nanometre scale based on atomically thin 2D materials
- Development of 2D materials for energy storage
- Fundamental research on quantum electron transport in confined systems and ferroelectric and magnetism in reduced dimensions

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Shaolong Zhang
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Yuanhui Pan

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Lyu Shaozhen
Xia Houping
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Xingbo Ge
Ying Li

Atomic structure-composition of materials

Group leader:
Paulo Ferreira

The Atomic Structure-Composition of Materials group focuses on the study of the atomic structure, atomic composition and defect behavior of nanomaterials, through in-situ transmission electron microscopy (TEM), aberration-corrected TEM/STEM, electron diffraction and EELS/EDS techniques. In particular, the group is interested in understanding the relationships between the structure, composition and the properties of nanomaterials, and the fundamental underlying mechanisms of structural and property changes induced by crystalline defects. The material systems of interest include battery materials, proton exchange membrane fuel cells, catalyst nanoparticles and 2D materials.
Within the project Soft4Sense, the group is the responsible for the electron microscopy characterisation of the monolithic layers and stacks (multilayer).
The optimisation of the layers deposition will need a continue feedback in terms of characterisation in order to understand how the process behaves.
That characterisation will be carried out at two different level, monolithic layers and stacks, and by two different approaches, cross-section analysis by FIB-SEM or TEM/STEM analysis of lamellas.

Additionally, the group also contributes to the project SENTINEL with a complete electron microscopy characterisation of plasmonic nanoparticles, namely using SEM, TEM and EDX spectroscopy, for the rational design of optical biosensors.
The Atomic Structure-Composition of Materials group is also participating in the CaT4GtL project, with electron microscopy characterisation of catalysts and zeolites materials under development. The analyses include FIB lamella preparation and both probe and image aberration-corrected TEM/STEM.

Research lines:

- Development of novel materials for batteries to improve the battery power, and cycle and calendar life
- Optimization of proton exchange membrance fuel cells
- Fundamental understanding on the influence of defects for developing 2D nanomaterials
- Understanding the fundamental mechanisms of flash sintering to overcome conventional sintering issues

Staff researcher

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Visiting researchers

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Rúben Santos
Rui Pereira

Visiting students

Abbas Al-Rjoub
Manuel Macedo
Richard Godoy
Rita Simões

Electrodynamics of 2D Materials

Group leader:
Nuno Peres

The group of Electrodynamics of 2D materials has devoted its research to light-matter interaction involving two-dimensional materials. The techniques used by the group are many-body physics, ab-initio numerical method, and quantum and classical electrodynamics. The Electrodynamics of 2D Materials group has studied in a comprehensive manner the physics of polaritons in graphene and other 2D materials attaining a leading position in the field with two experimental-theory papers published in Science Journal. In particular, the group focus its research on light-matter interaction at the nano-scale when 2D materials are lay down on gold metallic gratings and on metallic cubes dispersed on the graphene surface. These two setups allowed to confine electromagnetic radiation in unprecedented small volumes much below the diffraction limit never achieved before. These type of systems can be used to build photodetector in the mid-IR and gas sensors. This theoretical effort is still ongoing and more top notch publications are expected. Another topic of research has been the comprehensive study of how electromagnetic radiation, both as free and as plasmonic fields, interacts with 2D semiconductors, superconductors, and magnetic 2D materials.

The group has been able to describe how excitons form in 2D semiconductors and van der Waals heterostructures of the same materials, both as homo- and heater-bilayers. The effect of temperature on electromagnetic absorption promoted by excitons has also been study and a complete agreement with the available experimental data has been achieved. The interaction of the plasmon field has show that the collective modes of superconductors can be unveiled which is often not possible using free radiation. The same approach has been used to probe the nonlocal properties of noble metals as well as the of the plasmon field with spin waves, a growing field of interest, specially for 2D materials where probing magnons with neutrons is very difficult due to the small volume of the materials and a corresponding small signal/noise ratio. The study of magnetic Van der Waals structures made of 2D magnetic materials is still in its infancy and great deal of effort is putting in the understanding of these new systems, with ramifications into magnetic sensing, magnetic probes, and magnetic storage.

Research lines:

- Theoretical and computational tools for the calculation of linear and nonlinear optical properties of 2D materials and their heterostructures
- Polaritonics of 2D materials and other related systems
- Spinwave dynamics of 2D magnetic materials

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Bruno Alexandre
João Henriques
José Gomes

Associates
Mikhail Vasilevskiy
Ricardo Ribeiro

Visiting Professor
André Chaves

Vitising students
Høgni Carlsson Kamban
Ícaro Moura

Food Processing and Nutrition

Group leader:
Lorenzo Pastrana

The research activity of the Food Processing and Nutrition (FPN) group is focused on using nanotechnology for developing applications for a new food system: sustainable, safe, healthier, and digital. The solutions proposed by the FPN group are focused in two main topics: food packaging and food personalisation. In food packaging the aim is to reduce food waste by creating intelligent and active packaging using biodegradable materials, avoiding the use of petrol-based plastics. To address these challenges, the FPN group set up a robust portfolio of solutions suitable for implementation in the food sector, including coating technologies, embedded materials and sensors for improving and enhancing barrier and functional properties of packaging. In food personalisation, the main focus is to face some of the society big challenges: ageing and diet-related diseases (obesity, diabetes, hypertension). The understanding of the micro and nanostructure of food ingredients (fats, proteins, and polysaccharides) and additive manufacturing technologies, such as 3D printing, allow to obtain new rheological and functional properties.

Therefore, the possibility to design new foods with enhanced and personalised bioactivities is opening the study of the modulation of gut-brain axis and the production of new foods, such as cultured meat. All the above mentioned solutions have to be safe and efficient. For that reason, the knowledge on the fate of new nanomaterials along the gastrointestinal tract is required. The FPN group is developing a gastrointestinal tract-on-chip, using microfluidics, aiming to assess safety and efficacy of new formulations for oral administration.

Research lines:

- Food packaging solutions, with antimicrobial, antioxidant and stimuli-responsive food packaging, and edible nanocoatings
- Personalised foods, with nanoencapsulation of bioactive compounds

Staff researchers

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Maria Inês Guedes
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Tiago Dias

Visiting student
Enrico Brigada
Mariana Santos Amorim

Associate
Gabriel DeSantis
Lidia Matias

Food Quality and Safety

Group leader: Marta Prado

The research activity of the Food Quality and Safety (FQ&S) is focused on the development of analytical approaches based on the combination of molecular biology and nano- and microfabrication technology in order to develop reliable analytical tools. The FQ&S group's core research is focused on food analysis, as well as applications in environment and clinical areas, due to the transversal nature of the group's approaches.

FQ&S works in the development of both targeted (detection of specific analytes using specific DNA amplification approaches and aptamer-based detection) and non-targeted (mainly through Next Generation Sequencing, NGS) tools.

The mission of the group is to integrate knowledge on molecular biology, nano- and microfabrication and analytical chemistry for the development miniaturised, faster and reliable analytical tools allowing sophisticated in situ analysis without requiring specialised knowledge to be used by different actors in the food value chain.

FQ&S aims to address the main challenges in food safety and quality, and related areas, by deploying the latest advances in miniaturisation of analytical tools.

In the frame of the FCT-funded project PORTGRAPHE, FQ&S has developed two highly efficient DNA purification prototypes based on microscale solid phase extraction (μSPE) and microfluidics that have demonstrated their usefulness for both vegetal samples, namely grapes and leaves, and wine samples. Additionally, the group developed and tested a protocol for universal enrichment of DNA, and an efficient protocol for the functionalization of DNA on the graphene FET sensor, as well as a microfluidic chamber to enable automated functionalization and detection. In the frame of several of running projects, including NanoBioSensor (POCI-FEDER-033925) and SEAFOOD-AGE (Interreg-Atlantic Area, https://seafoodage.eu/), faster and innovative protocols have been developed to overcome the main bottlenecks for fast analysis in the case of both foodborne pathogens and spoilage responsible microorganisms, and faster detection methods based on isothermal DNA amplification. Likewise, an innovative protocol has been developed for the semi-targeted detection of foodborne pathogens in complex food matrixes.

Research lines:

- Miniaturised and faster analytical devices
- Development of fast, cheap and reliable analytical approaches
- Integration of miniaturised devices into (Internet of Things) IoT, and Automated Hazard Analysis and Critical Control Points (HACCP) as part of industry 4.0/smart industry
- Blockchain technology

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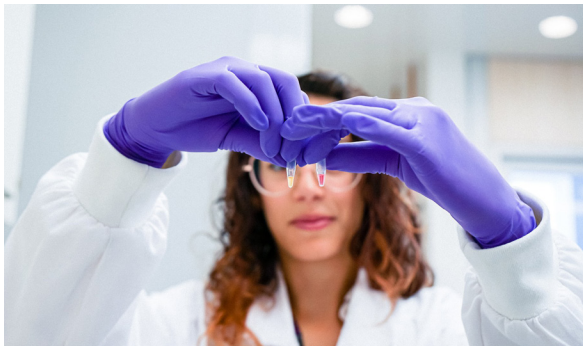

Integrated Micro and Nanotechnologies

Interim Group leader: Lorenzo Pastrana (mid/2020-2021)
Former Group leader: João Gaspar (2019-mid/2020)

The research activity of the Integrated Micro and Nanotechnologies group (IMiNa) is focused on developing and exploring new micro and nanotechnologies to develop devices that tackle high-impact challenges and address industry, market and scientific trends.
The group presents a broad scientific background in materials, physics, electronics, mechanics, optics, chemistry, engineering and microfluidics. Focusing on micro and nanotechnology, the competences in sensors and device development range from modelling, design and fabrication (extensive experience in state-of-the-art microfabrication techniques and tools), characterization (including electronic design, instrumentation and data analysis), integration and packaging. Through both funded and commissioned research projects, a large portfolio of technological applications are being developed: MEMS mirrors, inertial sensors, microspeakers, functional engineered surfaces, optical components (tunable filters and lenses), flexible and soft stretchable sensors, tactile sensors and microneedles with integrated sensors.

The group's research is oriented towards industry and market demands, collaborating closely with national and international partners to reach innovative nanotechnology solutions.

Research lines:

- Development of micro-electromechanical systems (MEMS) and flexible devices
- Development of micro optical elements
- Advanced integration technologies (system level integration and package integration)

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Laboratory for Nanostructured Solar Cells

Group leader: Sascha Sadewasser

The Laboratory for Nanostructured Solar Cells (LaNaSC) performs research and development (R&D) activities around the general topic of energy materials. A strong focus is on the development of advanced thin-film solar cells (mainly Cu(In,Ga)Se_2 based), implementing micro- and nanostructuring, their characterisation on the nanometre scale, and the growth of chalcogenide 2D materials and devices for optoelectronic applications.
Within the FCT-funded project "MiconCell", LaNaSC develops micro-concentrator CIGS solar cells, where micro lens arrays are used to concentrate the full impinging sunlight onto CIGS micro solar cells.
The micro-concentrator solar cell concept can lead to a reduction in CIGS materials needs by a factor of 100-1000 and a 4-6% increase in power conversion efficiency.
LaNaSC developed back-contact passivation schemes that permit reducing the absorber thickness by a factor of ~10, an alternative approach to reducing the need for critical raw materials., within the EU-funded project "ARCIGS-M".
Additionally, LaNaSC is developing micro-structured semi-transparent CIGS solar cells, which can transmit an arbitrary selected fraction of white light, providing an undisturbed vision through the window/solar cell, within the FCT-funded project "STAR-SOL", an international collaboration with the University of Luxembourg.

These projects strongly build on the nano- and microfabrication capabilities of INL's cleanroom and the electron microscopy facility for characterisation, in addition to LaNaSC's STAR (Sputtering for Advanced Research) deposition system for CIGS solar cells.
On the other hand, to support the basic understanding of solar cell materials and device development and enable an improvement-by-design, LaNaSC develops and applies nanoscale scanning probe microscopy (SPM) methods to characterize CIGS materials and thin-film solar cell devices, as well as 2D materials.
Several different methods are used, including Kelvin probe force microscopy (KPFM), conductive atomic force microscopy (c-AFM), time-resolved KPFM, AFM tomography, and scanning tunneling microscopy (STM).
These methods can be combined with illumination to study light-induced phenomena, e.g. charge separation.
Applying such methods, LaNaSC has heavily contributed to the understanding of the role of grain boundaries in polycrystalline CIGS solar cells, especially the role of heavy alkali elements used to achieve world-record performance levels.

Research lines:

- Development of advanced thin-film solar cells by the implementation of micro- and nanostructures
- Development and application of scanning probe microscopy techniques for the characterization of solar cell and two-dimensional materials and light-induced phenomena at the nanometre scale
- Development of growth and fabrication processes for chalcogenide 2D materials and devices
- Energy materials

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Medical Devices

Group leader:
Lorena Diéguez

The Medical Devices group's (MD) mission is to develop micro and nanodevices for better understanding of diseases, and to provide accurate diagnostics, for more efficient disease management options towards a more cost-effective healthcare.
The vision of the gorup is to contribute to citizens' wellbeing and health developing a new age of nano-enabled medical technologies.
During the last years, and through several funded projects, the MD group has developed novel and robust technology in the field of liquid biopsy for the non-invasive monitoring of cancer patients, through the isolation of Circulating Tumour Cells (CTC) and the analysis of mutations in circulating tumor DNA (ctDNA). The MD group developed a microfluidic system for fast and efficient isolation of CTCs based on their size and deformability. During the period 2019-2021, the performance of the system was validated in the clinic and demonstrated superior sensitivity and specificity than the gold standard in bladder, colorectal, esophageal, breast and gastrointestinal metastatic cancers.

The group also developed novel SERS nanobiosensors for the study of cancer-related mutations in body fluids. The optofluidic device was able to discriminate and quantify single-nucleotide variations with no pre-amplification in spiked samples, and demonstrated its capacity to profile multiplex mutational patterns in plasma samples from patients.
During 2020 and 2021, MD participated in Phase 1 (conceptualization) and 2 (prototyping phase) of the Anti-Superbugs Pre-Commercial Procurement (PCP) with the CULTURE project in collaboration with Gradiant (Vigo, Spain) and Bahía Software (A Coruña, Spain). The group developed an innovative solution for the characterization and unique identification of Volatile Organic Compound (VOC) mixtures produced by different bacterial strains with the goal to provide an early detection sensor for antimicrobials resistant organisms, representing a huge risk to life and health, as well as costs, within hospital environments. An innovative prototype was delivered based on photoionization detection of VOCs, representing an advance over current state-of-the-art.

Research lines:

- Non-invasive disease monitoring (biomicrofluidic systems to isolate disease biomarkers from body fluids)
- Early and accurate disease diagnosis (nanobiosensors to study and evaluate disease biomarkers)
- Disease modelling (biomimetic 3D organ-on-a-chip systems to model processes in disease evolution and treatment)
- Medical instrumentation technology development

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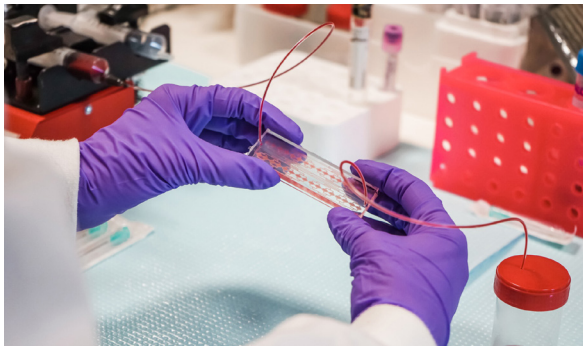

Nanochemistry

Group leader: Yury Kolen'ko

The Nanochemistry research group combines complementary efforts of enthusiastic synthetic chemists, materials scientists, and coating engineers to develop and study unconventional nanomaterials as a one-stop platform for emerging and future applications in the field of sustainability and circular economy. The group focuses on nanomaterial development following the strategy CSI: Catalysis, Synthesis, and Investigation. The Nanochemistry group is working on critical-raw-material-free catalysts for water electrolysis. Particularly, the group works on the development of efficient sustainable catalysts for hydrogen and oxygen evolution reactions (OER) based on earth-abundant materials, and has demonstrated that transition-metal borides and phosphides, such as NiP_2 and FeP, are highly active catalytic materials for water electrolysis. Within the FET-Open project SpinCat, the group is currently investigating magnetic earth-abundant catalysts that, through spin polarisation, will boost catalytic activity towards OER. The group is also working on nanomaterial-based coatings in collaboration with companies to provide solutions e.g. in anti-biofouling, protective coatings, and high-resistance materials. Within the H2020 project Marewind, the Nanochemistry group is developing self-healing coatings with anticorrosive properties for off-shore wind facilities.
Additionally, the Nanochemistry group is developing nanomaterials for water monitoring and treatment. The group has shown that covalent organic frameworks (COFs) can efficiently capture contaminants from water, such as biotoxins, pesticides, and pharmaceuticals, and can extract these contaminants also from natural water. Additionally, the group demonstrated that by tuning the materials, specific contaminants can be preferentially targeted. The Nanochemistry group is also investigating nanomaterial-containing membranes for the degradation of organic pollutants, as well as developing nanostructured catalysts for the degradation of inorganic water contaminants.

Research lines:

- New materials and multi-functional coatings for sustainable solutions (water monitoring and treatment, air purification, smart cities, security, raw materials, manufacturing of added-value goods)
- Advanced nanomaterials for application in energy and catalysis focusing to reduce the dependence on critical raw materials (thermoelectric materials, electrocatalysis, CO2 conversion)

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Nanodevices

Group leader: Paulo Freitas

The Nanodevices group has been from the start of INL a seed and an example of interdisciplinary research where the state-of-the-art components (sensors, and in particular magnetoresistive sensors and thin-film technologies) together with their system electronics and microfluidics are applied to a variety of applications in ICT (industrial sensors), Health (biosensors, neuroelectrodes), Food and Environment areas (biosensors), covering most of the value chain. The device technology is cleanroom-based, and a magnetoresistive sensor pilot line has been developed (with Spintronics group and cleanroom personnel, and backups at INESC-MN) leveraging a strong international presence in the spintronics arena. Over the years, this interdisciplinary activity has spanned to other areas (precision farming, position, and pressure sensing systems, others) always on a collaborative and user-defined basis. Industry involvement in our research projects has been always a natural step towards defining challenges where our technologies and concepts can be applied.
The Nanodevices group is working on the development and integration of optical devices for monitoring grape maturation and vine water status in a real-time and autonomous fashion with a degree of precision comparable to the current gold standards (i-Grape). Additionally, the group collaborates in multiple projects towards the development of medical devices and tools (FIM4Stroke, Phages-on-Chip, MicroFISH-Phage, OCIDIAGNOSE, InNPeC, SofTE, HF-Chip, Mag4Bac, Catch). The group is also involved in the project Baterias 2030, which aims to develop/integrate electrochemical thin-film microsensors for the detection/monitoring of dissolved oxygen in coin cells batteries. Furthermore, Nanodevices collaborates in two agro-food projects, R&W Clean and Foodsense.

Research lines:

- Magnetic tunnel junction sensor pilot line
- Biosensors (magnetoresistive and others)
- Novel sensing platforms

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Nanofabrication for optoelectronic applications

Group leader:
Pedro Salomé

Founded in 2017, the Nanofabrication for optoelectronic applications (NOA) group focuses in the incorporation of nanotechnology in optoelectronic devices with a strong industrial and innovation potential. Energy applications are their core area, with the technological development done in-house using INL's state-of-the-art nanofabrication processes joining also several international collaborations with industrial partners and with world-renowned institutions ensuring that our technology is incorporated in industrial relevant devices. The core competences of the group are bottom-up nanofabrication and characterization of optoelectronic materials and devices. NOA´s nanofabrication cornerstone is INL´s cutting edge and semi- industrial clean room facilities. The vast international experience of the group members in semiconductor materials is the backbone of the characterization capacities. These competences are the stepping stones that allow the group to collaborate with industrial and academic partners in: developing technology, prototyping, validating fabrication processes, products, among others; leading to a high connection to industrial partners nurturing innovation.

NOA is the scientific leader of the project Baterias2030, catalyst for the establishment of the Portuguese Battery Cluster association, and it is developing nanofabrication industry-friendly processes for building-integrated photovoltaics. NOA is also involved in the M-ERA NET program project KESPER, developing interface passivation strategies for kesterite materials to be used in photoelectrochemical cells for renewable gases. KESPER's objective is the demonstration of non-toxic, earth-abundant, and highly tuneable kesterite thin films for green-H2 and NH3 generation.
NOA is the scientific leader of the project SMART-PV and, following the strategy of INL in entering in digital activities, NOA group is developing computer vision solutions for the identification of failure modes in photovoltaic modules. Within the FCT-funded project NovaCell, NOA has been developing ultrathin solar cells. Reducing the thickness of the active layer was only possible by integration of light trapping and rear interface passivation strategies. Solar cells with the passivation strategy outperform reference counterparts by 2-3 % in conversion efficiency. Additionally, NOA is working on the development and characterisation of PVD based coatings for performance enhancement of Cr3+ coatings in replacement of Cr6+, within the PT2020 co-promotion project SafeChrome.

Research lines:

- New optoelectronic and energy materials, and advanced characterization techniques
- Novel nanoarchitectures of optoelectronic and energy devices
- Industrial collaborations

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Nanomaterials for Energy Storage and Conversion

Group leader: Lifeng Liu

The Nanomaterials for Energy Storage and Conversion (NESC) group conducts fundamental and application-oriented research on new functional materials that can be used for electrochemical energy storage and conversion. Besides intensive efforts to materials synthesis, the group carries out comprehensive physicochemical characterization in conjunction with studies of photoelectric, electrochemical and catalytic properties, to elucidate the structure-property relations and get fundamental understanding of the underlying physics and chemistry in energy storage and conversion processes. This in turn helps materials design and optimization. The group's research activities are currently focused on electrocatalysis/photoelectrocatalysis, and electrochemical energy storage.

The NESC group is involved in two major activities in the project Baterias 2030: a) the development of advanced Ir-less catalysts for oxygen evolution reaction (OER) in proton exchange membrane (PEM) electrolyzers and b) silicon anode materials for Gen. 3b batteries. The first milestone was the development of a process that allows scalable synthesis of multimetallic mixed Ir oxides, which shows electrocatalytic performance comparable to the state-of-the-art IrO2 catalysts for PEM water electrolysis, but with markedly reduced Ir loading of ≤ 1 mg/cm2 (FCH-JU 2024 target). Secondly, a demonstration of a battery cell based on the nano-silicon anode showing a specific capacity of ≥ 1000 mAh/g and cycle stability of 400+.

The Marie Curie Widening Fellowship aims to develop atomically-dispersed iridium catalyst to use as OER catalysts in PEM water electrolysis. The NESC group developed a recipe for synthesis of atomically dispersed iridium showing acidic OER activity better than and stability comparable to those of the state-of-the-art commercial Ir/C catalysts.

Research lines:

- Advanced catalytic materials for electrochemical energy conversion
- Solar fuel production
- Advanced electrode materials for rechargeable batteries and supercapacitors

Research fellows

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Nanomedicine

Group leader: Manuel Bañobre

Nanomedicine group (NM)'s research focuses on the development of diagnostic and therapeutic approaches towards an early and unequivocal diagnosis and treatment of diseases with strong focus on cancer and inflammatory conditions. NM explores new concepts and paradigms in the medical field through genuine research taking place at the frontiers of knowledge, aiming at overcoming current clinical needs and defeating new challenges to global health. To this aim, starting from fundamental understanding of disease and biological pathways, NM applies a cross-disciplinary research focused on the development of technologies and effective nanoparticles-based formulations for precise and accurate disease diagnosis, therapy and theranostics, ranging from low to medium technology readiness levels (TRLs). The NM group is currently working on the establishment of a full physicochemical and biological workflow for go/no-go decision making along the nano-formulation development process, within the EU-H2020 project PANA. Additionally, the NM group developed a biocompatible and magnetically-responsive injectable formulation able to promote active targeting in tumor cells under the external application of an alternating magnetic field (FCT project MagTargetON); and a temperature-responsive magnetic probe for the delivery and on demand release of immuno-stimulating drugs into solid tumors (FCT project SELF-i).

Research lines:

- Theranostic probes
- Animal-free validation platforms

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Nanosafety

Group leader:
Ernesto Alfaro-Moreno

The philosophy of the Nanosafety group is to have an integral approach for the evaluation of nanomaterial's safety, including approaches such as organ-on-a-chip, epigenetics and genotoxicity, immunotoxicity, toxicology, cheminformatics and life cycle assessment. The Nanosafety group was created with the project Sinfonia, an ERA-Chair grant, to develop new methods and technologies for the evaluation of nanomaterials.
The Nanosafety group is currently leading two projects:
as partner in the SbDToolbox project, supported by Norte2020, the group acquired the equipment for the Nanosafety Laboratory, and is working towards the Good Laboratory Practice (GLP) certification;
as coordinators in the LEARN project, granted under the Horizon Europe call related to Indoor Air Quality and Health. The project was granted in February 2022 and will be launched in May, and over 1 million € (out of 8 million € in total) are assigned to the tasks related to the Nanosafety group. With LEARN, the group is developing a multiplex-real time device to evaluate 3 different toxicological endpoints. Also, within LEARN the group is developing a skin-on-a-chip device.

Research lines:

- In vitro systems to evaluate the effects of nanoparticles and nanomaterials, using organ-on-a-chip technologies and avoiding the use of animals or human samples;
- Evaluation of epigenetic patterns of cells exposed to nanoparticles and nanomaterials;
- Quick and reliable evaluation of the toxic potential of different nanoparticles and nanomaterials;
- Development of *in silico* processes to evaluate nanomaterial properties.

Staff researchers

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Nanostructured Materials

Group leader:
Leonard Francis

The Nanostructured Materials group is involved in investigating fundamental aspects and dynamic phenomena at the atomic scale. This is achieved by employing state-of-the-art aberration-corrected TEM/STEM imaging and *in situ* experimentation in combination with image processing, simulations and theoretical calculations. The group works on current key topics towards implementing advanced electron microscopy techniques and their applications to a variety of nanomaterials, thin films, nanodevices etc. Some of the key materials investigated include energy related and catalytically important materials; the emphasis being on correlating their atomic structure and chemical composition with their properties and potential applications.
Understanding the atomic structure of materials is fundamental to exploring their various interesting properties: magnetic, optical and optoelectronic and this is achieved by carrying out aberration-corrected S/TEM imaging in combination with analytical electron microscopy.

Between 2019 and 2021, the group a) implemented aberration-corrected techniques towards the investigations of nanocatalysts, from nanoparticles, clusters to single atoms; b) implemented tomography-spectroscopy based techniques for simultaneous structural-morphological-chemical composition analysis of complex nanomaterials in 3D; c) explored novel phases of materials encapsulated within Nanotubes and related nanocavities; and d) investigated *in situ* transmission electron microscopy to understand nucleation and growth of solid-liquid phases at the interface.

Research lines:

- Metal nanoparticles and clusters
- Novel phase: 1D and 2D materials
- *In situ* TEM

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Natural and Artificial Photonic Structures and Devices

Group leader:
Martín López Garcia

The Natural and Artificial Photonic Structures and Devices (NAPS) group uses a highly multidisciplinary approach to investigate novel strategies for the manipulation of light-matter interactions at the nanoscale. NAPS research aims to develop sustainable high-performance photonic nanomaterials that can substitute current paradigms in photonic technologies by substituting critical and highly contaminant raw materials. To this end, NAPS group studies natural photonic systems as either biotic photonic nanomaterials or as bioinspiration. A strong focus of the group is set on the growth and extraction of biotic nanomaterials whose optical properties can be competitive with synthetic technologies in order to provide a green and sustainable source of advanced materials for photonic applications. NAPS is also developing nanomaterials inspired by the light-harvesting strategies of photosynthesis in plants and algae with the aim to tailor absorption and energy transport for more efficiently and adaptative energy harvesting.
The FCT funded project NASCADIA is framed within NAPS activities to achieve advanced photonic devices from natural sources. In this project, the group is developing methodologies to modify and extract the nanoporous silica from diatom microalgue that presents a well define nanopatterning with light-trapping properties. This project is exploring methods for in-vivo doping of the biosilica nanostructures in the laboratory which will confer to the final silicate ad-hoc photonic properties hence providing high-end nanotechnology for photonics out of this ubiquitous microorganism.
NAPS also participates in the development of photonic nanomembranes for production of vacuum-UV and UV-C radiation via third-harmonic generation, within the European funded project LEARN. These nanomembranes will be used in the detection of different harmful components in the air.

Research lines:

- Natural materials for advanced photonic applications
- Biomimetic photonics for substitution of raw-critical materials in quantum technologies and energy harvesting
- Integration of atomically thin materials in photonic devices

Research fellows

Johannes Goessling
William Wardley

PhD candidates

Francisca Guedes
Miguel Castillo
Paula Martinez
Vitória Baptista

MSc students

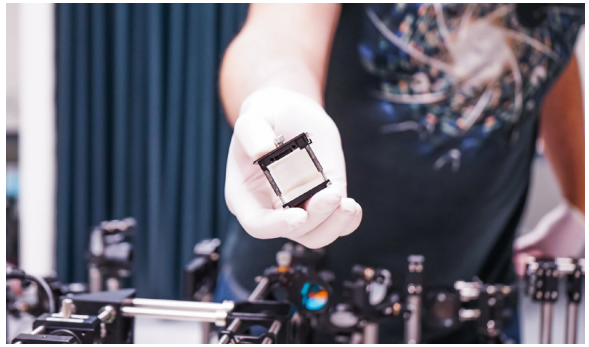
Alexandre Martinez
José Gama
Rafael Vilarinho
Ruth Victoria Esho

BSc students

Ana Alejandra Santiago
Beatriz Deitado
Pedro Pereira

Visiting students

Monica Canabal Carbia
Vijaya Raj



Precision Medicine Engineering

Group leader:
Weng Kung Peng

The Precision Medicine Engineering research group work was focused on developing and translating technological innovations (e.g., nuclear magnetic resonance, electron spin resonance) for the rapid molecular phenotyping into clinical point-of-care system. The Precision Medicine Engineering research group was dissolved at the end of 2021.

Research lines:

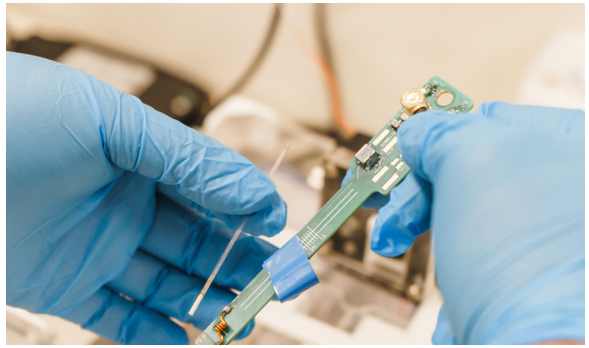
- Personalized oncology medicine using molecular fingerpritining of liquid biopsies
- Malaria detection using nuclear magnetic resonance
- Machine-learning assisted rapid phenotyping of hemoglobinopathies

Research Fellows

Daniele Paesani
Mrinalinee Pandey
Murali Kumarasamy
Teng Zhang
Vitória Baptista
Xiaofang Li

Visiting Researchers

André Alves
Bárbara Dias
Maria André
Mariana Teigao
Murali Kumarasamy
Ruth Esho
Tiago Sardo
Vasco Santos
Victor Gonçalves
Vitória Baptista



Quantum and Linear-Optical Computation

Group leader:
Ernesto Galvão

Quantum information science has the potential to revolutionize information processing, in the form of dramatically faster quantum algorithms and novel protocols for cryptography, metrology, and sensing. The Quantum and Linear-Optical Computation (QLOC) group does theoretical work exploring the features of quantum theory that enable advantage in quantum information processing tasks, in particular those present in photonic implementations of quantum computers. QLOC is a partner in the FETOPEN project PHOQUSING (PHOtonic Quantum SamplING machines), which aims to develop large, reconfigurable interferometers with active feedback, using state-of-the-art photon sources based both on quantum dots and parametric down-conversion. The group will optimize the experimental chip designs, studying the tolerance to errors. The project aims to build two quantum sampling machines with different technologies, as a way to do cross-checks while exploiting all advantages of each platform. These machines will establish a new state-of-the-art in photonic reconfigurability, system complexity, and integration, with proof-of-principle demonstrations of Hybrid Quantum Computation applications in optimization, machine learning, and graph theory.

QLOC is also a partner in the ERC Advanced Grant QU-BOSS (QUantum advantage via non-linear BOSon Sampling). The aim of QU-BOSS is to experimentally push towards the quantum computational advantage regime with integrated photonic technology, introducing non-linearities acting at the single photon level embedded within the Boson Sampling interferometer. The group will use complementary approaches to map out how the addition of non-linearity boosts the device's complexity, making it harder to simulate classically. QLOC will use different approaches to implement these devices with hybrid integrated quantum photonics. Finally, the group will deploy the developed technology to implement two different architectures demonstrating quantum machine learning: a hybrid model of quantum computation and an optical quantum neural network.

Research lines:

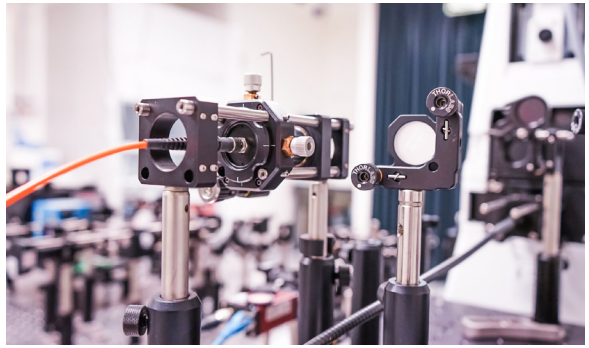
- Resources enabling quantum computational advantage using photonic quantum computers, implementation of photonic quantum computational devices;
- Optimization of different models of quantum computation, with a view to implementations in near-term quantum devices;
- Quantum software engineering: development of formal models for programming of quantum computers, classical simulation, variational algorithmic approaches.

Staff researchers

Rui Barbosa
Raffaele Santagati

PhD candidates

Filipa Peres
Angelos Bampounis
Anita Camillini
Antonio Molero
Carlos Fernandes
Michael de Oliveira
Rafael Wagner
Raman Choudhary



Quantum Software Engineering

Group leader:
Luís Soares Barbosa

The Quantum Software Engineering (QSE) research group aims to develop quantum computer science and software engineering as a mature discipline for the mathematical specification, analysis, design and verification of quantum algorithms and software systems, and its application in strategic problem-areas. Its research goals are organized around two main research lines – quantum computer science and quantum software engineering.
The group investigates appropriate semantic structures, able to comply with different types of classical control (non-deterministic, probabilistic, continuous) and quantum data, as well as to capture a suitable notion of program approximation upon which a theory of quantum program refinement and equivalence can be based. Additionally, QSE group develops algorithmic calculi, stemming from the semantics above, for the systematic derivation of quantum programs in a compositional way; and dynamic logics for the quantum domain to support the formulation of contracts for quantum algorithms and their compositional verification.
The QSE group also works on the identification of real-world problems and design of applications that can benefit from the 'noisy' quantum computers currently emerging, namely in the context of the QuantaLab IBM Q Hub. Additionally, QSE develops new quantum and hybrid algorithms, enabling for effective, noise-tolerant, deployment of the above applications on quantum computing systems; and compositional methods for coordination of distributed quantum computational system - a main requirement for obtaining optimally responsive global quantum networks, but currently largely overlooked.

Research lines:

- Logics and calculi for verification of quantum programs
- Specifying quantum programs
- 'Just Good Enough' quantum programming
- Quantum numerical integration
- Global light transport simulations

Associates

José Nuno Oliveira
Luís Santos

PhD candidates

Ana Neri
André Sequeira
David Ferreira
Manisha Jain
Zeinab Rahmani

Spintronics

Group leader:
Ricardo Ferreira

The Spintronics research group explores two parallel research lines wich have in common the fact that both rely heavily on the development and exploitation of devices based on magnetic tunnel junctions. The fist line concerns the development of ultra-sensitivive magnetoresistive sensors. This activity has a wide range of applications (sensing of linear motion, angular motion, electrical currents, magnetic imaging, ultra-weak magnetic fields) and the research group has been involved in several projects with Industrial partners to take profit of the advantages provided by these devices, including the creation of a pilot line for the production of magnetoresistive sensors at INL and several projects trying to make use of these sensors within novel paradigms of machine condition monitoring. The second line concerns spin dynamics and spin transfer torque nano-oscillators for future and emerging technologies. Spintronic nano-oscillators are extremely versatile DC->RF and RF->DC transducers which are being proposed as key building blocks for novel energy harvesting nano-devices, ultra low power IoT Communication systems and new disruptive paradigms for computation and information processing. In the last few years, this research line has been the focus of the participation of the research group in several highly competitive European projects.

Research lines:

- Magnetoresistive sensors
- Spin dynamics and Spin Transfer Torque Nano-Oscillators.

Staff researchers

Alex Jenkins
Elvira Paz
Tim Böhnert

Research fellows

Alejandro Schulman
Artem Talantsev
Luana Benetti
Marcel Claro

Research engineers

Paulo Coelho
Pedro Anacleto
Sai Krishna

PhD candidates

Henrique Teixeira
Leandro Martins

Visiting students

André Nunes
Asfand Tanwear
Diogo Pataco
Richard Kim

Theory of Quantum Nanostructures

Group leader: Joaquín Fernández-Rossier

The group of Theory of Quantum Nanostructures (TQN) is devotedto the understanding of emergence, in nanoscale systems and atomically precise materials, of non-trivial quantum phenomena such as coherence, entanglement and topological order and their exploitation in applications such as quantum sensing and quantum computing.
The TQN group does theoretical research with extensive use of numerical computations. They are interested in a variety of systems, including 2D materials, most notably magnetic 2D materials, bottom-up atomically precise artificial on-surface systems made both with magnetic atoms and molecules, and the development of theoretical frameworks to interpret experimental results, most notably in the area of scanning probe microscopies. The TQN group has also a research line devoted to the development of quantum algorithms to carry out quantum simulations in quantum computers. Recently, the TQN group discovered a symmetry-protected topological Haldane phase, with potential for measurement-based quantum computing, in bottom-up atomically precise nanographenes (Nature 2021). The research group also invented an algorithm to prepare Gutzwiller states in digital quantum computers (Murta, Rossier, Phys. Rev. B 2021).

Additionally, the research group collaborated with the experimental group who reported the observation of Shiba states in graphene, which had been predicted by the TQN group in 2016 (Advanced Materials 2021).

Research lines:

- Emergent electronic properties in Van der Waals heterostructures
- Atom by atom design of quantum states
- Quantum computing for quantum simulation

Research fellows

Alejandro Molina-Sánchez

PhD candidates

Bruno Murta
Gonçalo Catarina
Luísa Madail Pimentel
Pedro Cruz
Yelko del Castillo

MSc student

Henrique Silvério

Visiting MSc student

Iria Bolaño Losada

Ultrafast bio- and nanophotonics

Group leader:
Jana Nieder

The Ultrafast Bio- and Nanophotonics (UBNP) group is composed by an international and interdisciplinary team of physicists, chemists and bioengineering researchers that study light-matter interactions and their deployment in biomedical imaging, quantum sensing and light based computation.
The group attracts public, philanthropic and private funding for our research endeavors and have collaborators across the globe to jointly advance the fundamental knowledge as well as technologies in the three strategic research lines of 'Advanced Bioimaging and Sensing', 'Quantum Photonics' and 'Integrated Photonics'.
The UNNP group regularly trains PhD and Master students and hosts visiting scientists, as well as artists in frame of cross-disciplinary projects.
In the area of 'Advanced Bioimaging and Sensing', UBNP made sensitivity breakthroughs reaching 1nm axial resolution using near field quenching by graphene to track labeled DNA in a genosensing platform. Further, the group invented and demonstrated a contact-less nano/microtopography metrology technique (CLeANFIT; On4SupremeSens project), and developed intracellular temperature sensing methods to map metabolic activity and in vitro live cell magnetic hyperthermia treatments.

The UBNP group is spearheading the use of few-cycle ultrabroadband laser sources in the field of multi-photon microscopy (patent submitted; ExtreMED project), and pioneered metabolic imaging for nanomedicine research.
In the area of 'Quantum Photonics', UNBP attracted funding in various collaborative projects: QUA-ND-O, Diamond4Brain, DIAMOND-CONNECT as well as an INL seed grant. The achieved milestones relate to the development and application of quantum metrology for magnetic field sensing. NV centers in diamond were used to quantify magnetic fields created by individual magnetic nanoparticle aggregates. The group started to explore 1D/2D and 3D diamond photonics platforms for Parkinson's research and develop quantum metrology setups and a color-center-in-diamond-fabrication-platform at INL. Femtosecond laser-based 3D microfabrication was optimised for i) microstructured polymers, ii) multi-beam fabrication and iii) 3D optical waveguides for flexible integration of nanodevices.
In the area of 'Integrated Photonics', the research group developed a field propagation O-FDTD simulation method tested with nanofabricated polymer structures, and LoRa cityscape networks. Importantly, UNBP established the process of nanofabrication of III-V GaAs-based components with optimised low-resistance electrical contacts and surface passivation for high internal quantum efficiency of neuromorphic light-emitting devices for photonics based artificial intelligence hardware (FETOpen ChipAI project).

Research lines:

- Development and application of advanced bioimaging and sensing technologies
- Development of photonic integrated devices
- Single-molecule detection for quantum photonics

Staff researcher

Bruno Romeira
Christian Maibohm

Research fellows

Beatriz Santiago
Ima Ghaeli
Manuel Caño García
Miguel Ferreira Cao
Oleksandr Savchuk
Oscar Silvestre
Rajesh Tamang

Junior research fellows/ PhD candidates

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Bejoys Jacob
Filipe Camarneiro
João Júlio Martins
Ricardo Adão

Associate junior research fellow

João Paulo Silva

PhD candidates

Maria João Lopes
Tiago Queirós

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Ânia Barata Micaelo
Artur Andrishak
Carlota Carlos
Hugo Sebastião
Joana Tátá
João Azevedo
João Freitas
Luís Mano da Costa
Luís Miguel Cosme Leston
Pedro Moura
Pedro Silva
Tiago Alves

Visiting researchers

Ana Maria Marote
Carla Estévez Varela
Fernando Gordo
João Pedro Lourenço
Riazul Arefin
Ricardo Fernandes
Sara Núñez-Sánchez
Sebastian Thompson

Water Quality

Group leader:
Begoña Espiña

The Water Quality group (WQG) was founded in October 2016, visioning the development and application of nanotechnology solutions for a safe and sustainable use of water resources.
The mission of the WQG is to overcome some of the most challenging issues in water environment making responsible use of original applied research on environmental nanotechnologies.
The WQG coordinates since 2019 the Interreg Atlantic Area project NANOCULTURE, which objectives are to advance in knowledge, risk assessment and mitigation of environmental presence of the most-used engineered nanoparticles: titanium dioxide (TiO_2) and silver (Ag) in market products. Here WQG investigates the effects of these nanoparticles on aquaculture products, their bioaccumulation and assess its impact in human intake. In addition, the group develops SERS-based sensors, which will enable European aquaculture to make use of the digital revolution and provide real time on-site monitoring.
NANOCULTURE focus on species of high relevance in the Atlantic area; mussels, turbot and seaweeds
During the last years, WQG, together with Nanochemistry group at INL, have pioneer the development of COFs' application to adsorb organic contaminants and biotoxins from water. In 2019-2020 the group developed a composite material that was employed for the first time in magnetic solid-phase extraction of marine biotoxins from seawater and endocrine-disrupting pesticides from freshwater, with high efficiency.
Additionally, WQG showed for the first time, in collaboration with researchers from MARE (University of Lisbon), that COFs can be efficient adsorbents for the screening of pharmaceuticals in real water samples, obtaining highly representative data on their occurrence and avoiding the cost of carrying high volume samples and tedious and costly clean-up and preconcentration steps.
Finally, in a recent study, WQG demonstrated that by careful choice of COF functionalities, specific compounds can be targeted or excluded from a group of analogues, providing insight into the design of more efficient and selective adsorbent materials.

Research lines:

- Portable and unassisted detection systems for water contaminants
- Econanosafety – sensors for nanoparticles, econanotoxicity, and nanomaterials fate and bioaccumulation

Staff researchers

Laura Rodriguez-Lorenzo
Marília Santos
Raquel Queirós

Research fellows

Ana Castanheira
Ana Vieira
Antonio Rubino
Ivone Pinheiro
Marisa Passos
Monica Quarato
Najib Ben Messaoud
Patricia Taladriz Blanco
Riya Gupta
Samuel Silva
Sofia Azevedo

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Blanca Astray Uceda
Francy Patiño
Giulia Santopolo
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Tianxing Wang

MSc students

Ana Castanheiro
Maria Catarino
Rui Ferreira
Samuel Silva
Sofia Neto

BSc students

Beatriz Viegas
Filipe Ferreira
Mariana Alves
Tomás Pereira

Visiting researchers

Catarina Ribeiro
Dachamir Hotza
Juliana Dias
Moisés Canle López
Najib Ben Messaoud
Tânia Ribeiro
Vanesa Romero

2D Materials and devices

Group leader: Pedro Alpuim

The 2D Materials and Devices research group (2DMD) focuses on CVD growth, transfer, and device fabrication, using 2D materials, clean-room technology, and Raman imaging for structural characterisation. Particular attention is given to biosensing devices, for which immuno-assays and DNA sensors were developed based on graphene liquid-gate field-effect transistors. The device's specificity for particular biomarkers is achieved by functionalising the graphene channel. DNA detection based on electrochemical arrays of these graphene microsensors is achieved down at the attomolar scale.

The 2DMD research activity includes fabricating single-photon emitters from controlled defects in h-BN and graphene, and TMDC plasmonic devices that operate in the visible or sub-mm wavelength range.

The 2DMD uses its graphene chips in several projects, to detect e.g., counterfeit in Douro wines through DNA SNIP detection (project PORTGRAPH), the core protein of the Hepatitis C virus in blood plasma (with CAB and ICMM-CSIC, Madrid), or the plasmodium malariae to detect malaria in the saliva of infected patients (MULTIMAL). In such projects, the graphene chip is placed in the center of a well that receives the liquid sample (≈ 10 µL) containing the analyte or is integrated into a lab-on-a-chip (LoC) programmable microfluidic device. In the framework of the project NeuralGRAB funded by "La Caixa" Foundation, the 2DMD is working with the University of Minho Medical School and the Madrid Astrobiology Center to achieve brain activity recording of a panel of neurotransmitters with physiological spatiotemporal resolution using multiplexed graphene transistor platforms.

The 2DMD is active in flexible electronics, developing 2D materials-based inks, pastes, and slurries, making inkjet, screen-printing, or spray coating available to deposit materials from the liquid phase to fabricate flexible devices at low cost.

In the GEMIS project, the group is developing versatile electromagnetic interference (EMI) shielding solutions based on a universal formulation for a liquid dispersion of graphene materials. In the 2DM4EH project, the group is working towards the demonstration and extension of the potential of ultra-thin transition-metal dichalcogenides (TMDCs) and conjugated polymers as the building block for energy harvesters. In collaboration with the Indian Institute of Science, Bangalore, a dual device made of a photovoltaic cell and a rectenna are fabricated on the two sides of the same flexible substrate. The device under development will exploit both power sources (i.e., light and RF radiation).

Research lines:

- Development of graphene devices for bio-applications
- Advanced processing of 2D materials for technological applications
- Flexible, lightweight, and foldable electronics, with graphene-based materials, for energy and environmental applications
- Cost-effective radio-frequency devices based on graphene
- Photodetectors for integration with microfluidic platforms for clinical use and quality control of food and water
- Single-photon emitters for quantum optical technologies

Staff researchers

Andrea Capasso
Jérôme Borme

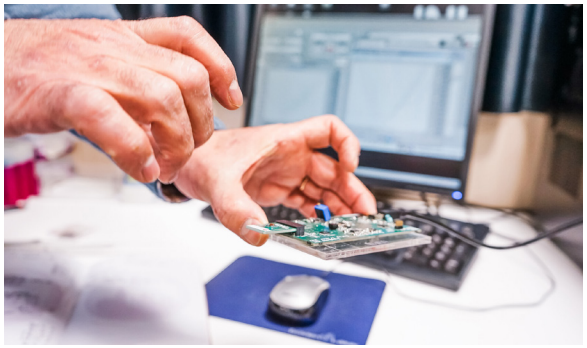
Research fellows
Alexandre Chícharo
Juan Luis García Pomar
Miguel Monteiro
Sergey Tkachev
Siva Sankar
Telma Domingues

PhD candidates
Balaji Sompalle
Ivo Colmiais
Patrícia Silva
Rabiaa Elkarous
Vitor Silva

MSc students
Bruna Martins
Diogo Miguens
Elisabete C. Fernandes
Gabriel Ferreira
Jiri Severa
João Fernandes
João Santos
Lucas Baptista
Lucas Silva
Mafalda Abrantes
Teresa Rodrigues
Tiago Queirós

BSc students
Daniel Miranda

Visiting researchers
Bruna Silva
Jean-Eric Bourée
João Rodrigues
Maria Cerqueira



Systems Engineering

Group leader: João Piteira

The focus of Systems Engineering group is to bring nanotechnology developed at INL into form-factors compatible with applications in the areas of ICT, health, agri-food and environment. The high levels of integration and miniaturisation required for such applications can be often achieved via custom-designed microelectronics solutions, in particular CMOS technologies that enable both high-performance and mainstream adoption of the resulting devices.

The group's main mission is to use electronics and microelectronics combined with nanotechnology to solve challenges within those application areas, designing and implementing hardware applications that are power, size and cost efficient. The group focuses in system integration of advanced sensing and actuating technologies while optimising the integration of analogue mixed-signal conditioning, data acquisition and processing functions into "smart" system-on-chip (SoC) or system-in-package (SiP) hardware devices.

Within the advanced CMOS hybrid devices research line the group has reached higher levels of integration in CMOS with a novel mixed-signal analog front-end for optical devices with ability to detect low level, optical signals (i-Grape). Additionally, the Systems Engineering group continued their efforts towards higher integration of MEMS devices with new CMOS capacitive readout front-ends in collaboration with the iMiNA group (Link4Sustainability), including a new charge pump and high-voltage switch device (MSc thesis) to drive the MEMS structures (Link4Sustainability and Moore4Medical), designed and fabricated in a low power CMOS process. A long term effort started in 2018, to develop an air quality sensor (CO_2) for environmental monitoring based in metal oxide technology, has reached another milestone with further improvements in the fabrication process (Nanoeaters, Nanobiosensor and RE-EAT) that led to the development of LoraWan based IoT WSN for agriculture and food applications. A new embedded software (firmware) that includes the full LoraWan stack has been completed (i-Grape). Wireless sensor systems have been deployed in the field providing real-time data for further analysis and processing (using chemometrics in collaboration with thr Nanodevices group).

System integration efforts for electrochemical sensors and readout systems are on-going with various projects in collaboration with the Water Quality group. A full hardware and software portable system able to run potentiostatic measurements has been completed (addressing biomedical and environmental applications as in Biosensor4Fetus, SEALAB and NGQC IoRT). Further developments towards miniaturized embedded systems that include multiple electrochemical measurement techniques (impedance measurements) are ongoing (R&W Clean).

Engineering topics:

- Advanced CMOS hybrid devices
- Smart system integration
- Ultra low power and autonomous wireless sensor networks

Research fellows

Accel Abarca
Mitesh Parmar
Sigit Yuwono

Research engineers

Álvaro Geraldes
António Leite
Carlos Marques
David Araújo
José María Loché
Thiago Darós

PhD candidates

Alessio Tugnolo
Rui Machado

MSc student

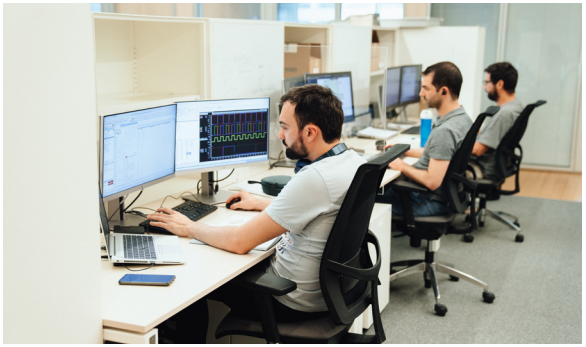
Francisco Barreira

BSc student

Hugo Sousa

Associate

André Ferreira
Moustafa Mohamed



Technology Engineering

Group leader: Marco Martíns

The Technology Engineering group was created in 2021. With the aim to raise the relationship with the industry and accomplish the goals set by the Norte 2020 funded project EngineerIT, the Technology Engineering Group (TEG) at INL is targeting to build demonstrators and contribute to the exploitation and tech transfer at INL, namely in projects/results where the 'last mile' is missing to accomplish something tangible. The TEG aims to increase technology readiness level (TRL) of INL technologies by making usage of its skills and capabilities. The core competences of the group are in the areas of Electronic, Mechanical and Computer Engineering. The TEG is focused on a) advancing a prototype of an automated system for total microcystin-LR quantification in freshwater; b) an integrated micro total analysis system for DNA/RNA; c) a data acquisition platform for magnetoresistive sensors for applications within Industrial Tool Condition Monitoring; and d) a portable detection system for Aeromonas salmonicida in seawater aquaculture systems.

Engineering topics:

- Mechanical engineering
- Artificial intelligence
- Computer vision and engineering
- Electronic engineering

Research engineers

Adriano Pedro
Aravind Marimuthu
Diogo Regalo
Duarte Mota
Ensieh Iranmehr
Fábio Martins
Jaymin Patel
João Martinho Moura
Kamya Yazdandoost
Luis Paula
Marco Martins
Miguel Da Silva Ferreira
Victor Joco

Members of the International Business Advisory Board

Adam de Sola Pool
Antonio Murta
Beth Topolovsky
Björn Segerblom
Carlos Oliveira
Gerard de Bourbon
Hans Möller
Magnus Ryde
Usrula Hultkvist Bengtsson

Former Members of the Internacional Business Advisory Board

Massimo Gentili
Yvonne Mårtensson

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Alke Fink
Ayodhya Tiwari
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Jürgen Brugger
Kristina Edström
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Luisa De Cola
Manuel Martín-Lomas
María Jose Alonso
María Varela del Arco
Mark Welland
Nuno Sousa
Pedro J. Álvarez
Vincent Cros

INL User Facilities

Introduction

Foreword

Research, Development, and Innovation are supported by the Research Core Facilities of INL, a centralised infrastructure that provides access to advanced equipment, techniques, and expertise. It operates as an open-access facility and offers INL Research Groups and researchers from academia and the industrial sector a portfolio of services ranging from design to fabrication and characterisation. It is composed by the Micro and Nanofabrication (MNF), the Advanced Electron Microscopy, Imaging and Spectroscopy (AEMIS), the Nanophotonics & Bioimaging (NBI) and the X-Ray Diffraction (XRD) facilities.
These facilities are run by highly qualified scientists and engineers with a service-oriented mindset who provide support throughout the entire research and development value chain.

An impacting factor of INL Research Core Facilities is the heterogeneous set of techniques available under the same roof, leading to competitive integration of different technologies and multidisciplinary collaborations internally and with external partners.

Beyond the certification of the Research Core Facilities according to ISO 9001:2015 standard achieved in 2018, 2020 was marked by the certification according to ISO 13485:2016 in Medical Devices.

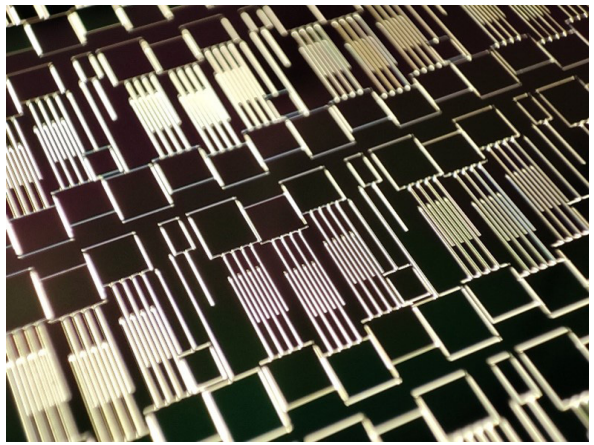
INL User Facilities in Numbers (2019-2021)

Facility	Usage Hours	Of Bookings	Of Users	Of Serviced Groups	Of Licenses	External Users/ Services
Micro and Nanofabrication	47415	23902	244	20	1579	150
AEMIS	29566	7831	194	18	300	148
Nanophotonics & Bioimaging	33317	17083	327	20	764	10
X-Ray	7537	1931	99	20	63	1

3 year review in numbers

Micro and Nanofabrication (MNF)

The Micro and Nanofabrication Facility operates a Class 100 cleanroom with a total area of 1000m^2. It offers access to a state-of-the-art equipment suite for micro- and nanofabrication solutions on substrates from 200-mm-diameter wafers down to samples below 10 mm with application ranging from electronics, medical devices, microfluidics, energy and sensors.
Besides training and supporting users, the facility also offers contracted research and services performed by the facility staff in device design, process integration and device fabrication, packaging, and testing.
In 2019, the Micro and Nanofabrication Facility has reinforced its capabilities with the acquisition of a Nanoimprint system and increased redundancy and throughput with an additional ICP Etcher tool, an additional Mask Aligner and a Cluster upgrade of multiple plasma tools.



200 mm-thin wafer (340µm thickness) highly populated with microprobes fabricated with new negative-tone resist and exposed in the new 8-inch Mask Aligner. Silicon etched through by Deep Reactive ion Etching.

Available technologies

- High-precision silicon micromachining;
- MEMS and NEMS;
- Spintronic sensors and hybrid devices;
- Flexible sensors devices
- Thin-film devices
- Graphene-devices, carbon nanotubes (CNTs) and 2D materials
- Microfluidic devices and silicon masters;
- Nanostructuring methods for solar cells and other devices

Achievements & Milestones

- Definition of new process wiki
- New Training Policy established
- Digitalization of stock control
- Increased collaboration with industrial partners (8 new partnerships)
- Improvement of risk assessment procedures at project level
- Qualification of new process based on grayscale lithography
- Qualification of new photoresist materials for reactive ion etching

New Equipment

Installation of:

- Nanoimprint system
- Additional ICP etcher tool installed
- Cluster upgrade of multiple plasma tools
- Additional Mask Aligner for 200 mm wafers and auto-alignment feature

Acquisition of:

- Spin Rinse Dryer system
- Additional Plasma Asher system

Courses

- Partnership with Minho University - Physics Engineering Course to host Micro and Nanofabrication practical classes at MNF Facility

Advanced Electron Microscopy, Imaging and Spectroscopy (AEMIS)

The Center for Advanced Electron Microscopy, Imaging and Spectroscopy is a core multi-user facility that features cutting-edge instrumentation, techniques and expertise required for the characterization of samples in the physical and life sciences. The facility focuses on materials and biological research, development of novel techniques and instrumentation, as well as providing training, technical support and consultation in the areas of electron microscopy and spectroscopy. The center facility houses several electron microscopes that can probe the physical, electronic and chemical structure of matter down to the atomic scale. These instruments are coupled with advanced in-situ holders, in which the environment is controlled to match near-realistic conditions of operation, and the sample's behaviour is recorded dynamically in real time. State-of-the-art support facilities also are available including standard specimen preparation equipment and an image analysis laboratory.

Recently purchased Glacios 200 kV Cryo-TEM for Life Sciences

Available technologies

- Monochromator
- Corrected TEM Imaging (Resolution 63 pm)
- Corrected STEM Imaging (Resolution 63 pm)
- Diffraction (Crystallographic analysis)
- EDX – Super X (Chemical analysis)
- Dual EELS (Energy resolution 190 meV)
- Electron Holograph
- Differential Phase contrast (DPC) imaging
- Lorentz microscopy
- In-situ sample holder (heating/biasing)
- TEM/STEM Tomography (3D Reconstruction)
- Cryo (Biological samples/Soft matter)
- Tomography (3D reconstruction)
- SEM Imaging (Resolution 1 nm)
- Low vacuum/"Environmental" SEM Imaging
- (Biological samples/Soft matter)
- EDXS (Chemical analysis)
- Cooling/Heating stage (in-situ) » -20°C – 1500 °C
- SE/BSE detectors (Topographical/Structural analysis)
- HRSEM Imaging (Resolution 0.9 nm)
- FIB - Ga+ ions (Imaging/Patterning)
- EDX (Chemical analysis)
- Lamella preparation
- Cross section analysis
- Slice & View (3D reconstruction)
- Patterning: Milling/Deposition (Pt or W)
- Enhanced etching (Iodine) and Selective Carbon Etching ($MgSO_4 \cdot 7H_2O$)
- Electron Analyser (0 – ±5000 eV)
- Detection System (6 channels, 2D position detector)
- X-ray Sources (Monochromatic Al K and twin anode Mg K / Al K)
- Sample Navigation and Manipulation (Automated
- Sample Manipulator and Azimuthal stage Rotation)
- Heating and Cooling of Specimen
- UV Source
- Flood Sources (Charge compensation and REELS)
- Monoatomic and Gas Cluster Ion Source for depth profiling "soft" (cluster mode) and solid (monoatomic mode) materials

Achievements & Milestones

- Entering the National Roadmap of Infrastructures
- Coordinating the CryoEM-PT Network
- Acquisition of a Glacios 200 kV Cryo-TEM for Life Sciences
- Development of the Differential Phase Contrast Technique
- Setup of identical location TEM
- Novel Method for the Preparation of Lamellas for In-Situ TEM Heating/Biasing Experiments

Equipment acquired

- Glacios 200 kV Cryo-TEM
- Vacuum Furnace
- Sputtering Carbon Coater
- Microtome

Courses

- Electron Microscopy Course (theoretical and practical classes hosted at AEMIS Facility)

Nanophotonics & Bioimaging (NBI)

The INL Nanophotonics & Bioimaging (NBI) Flagship Facility provides a comprehensive set of high-end commercial solutions for imaging and optical spectroscopy suited for the characterization of biological samples and the characterization of new materials. Besides performing frontier research in advanced bioimaging and sensing, the aim is to become an innovation partner in the photonics technologies sector collaborating with research groups and innovative photonics as well as microscopy companies.
Over the last years, we have striven to integrate the various advanced light microscopy and spectroscopy solutions into a dedicated user facility with a clear technology portfolio, a unified booking system and a user training program, empowering INL and external researchers and collaborators with an open access platform, fostering interdisciplinary use of the equipment. 2020 was marked by the integration of the INL NBI Facility in the Portuguese Platform of Bioimaging (PPBI).

3D Cell Explorer Holotomography microscope from Nanolive and (b) NANOSIGHT NS300 from Malvern Panalytical.

Available technologies

- Advanced Optical Microscopes
  - Nikon Ti-E TIRF - Inverted Widefield/ Fluorescence Microscope
  - Zeiss LSM 780 - Confocal Microscope
  - Witec alpha300 R - Confocal Raman Microscope
  - Nikon Ti-E - Microfluidics Fluorescence Microscope
  - Nikon Ni-E - Upright Widefield/Fluorescence Microscope
- In-house custom-developed Microscopes and Spectroscopy Solutions
  - Multi-Photon Microscopy, SHG, FLIM, Fluorescence anisotropy, confocal ODMR
  - JPK AFM NanoWizard3 combined with Nikon TI-S/L100 - Fluorescence Microscope
  - Accurion upgraded Nanofilm_ep3_se - Spectroscopic Imaging Ellipsometer
- Materials, Particles, Molecules and Cells Analysis
  - BioRad S3 Flow Cytometry and Cell Sorter System
  - Biotek Synergy H1 - Microtiter Plate Reader
  - Horiba SZ-100Z - Dynamic Light Scattering (DLS) System
  - Q-Sense E1 - Quartz Crystal Microbalance (QCM)
  - Bruker AFM Dimension Icon - Atomic Force Scanning Probe Microscope
- Optical Spectroscopy Solutions
  - Bruker Vertex 80v vacuum - Fourier Transform Infrared (FTIR) Spectrometer
  - Woollam M2000 - Spectroscopic Ellipsometer
  - Jasco J-815 - Circular Dichroism Spectroscopy System
  - ISS ChronosBH - Fluorescence lifetime, emission, excitation and anisotropy

    - PerkinElmer LAMBDA 950 - UV-VIS-NIR Spectrophotometer
    - SHIMADZU UV-2550 - UV-Vis Spectrophotometer
    - Horiba FluoroMax-4 – Fluorescence Spectrometer
    - G:BOX CHEMI XT4 - Gel Imaging and Fluorescence System
- Nonlinear Microfabrication
    - Newport, uFAB & Spectra Physics, Tsunami - Microfabrication work station and ultrafast femtosecond laser
- Optical Microscopes
    - Nikon MA200 – Microfluidic Chips Inspection Microscope
    - Nikon LV100 ND - Upright Optical microscope
    - Nikon SMZ 1500 - Diascopic Stand 2 Stereoscopic Microscope
- Data Analysis for Microscopy, Spectroscopy and Flow Cytometry
    - HP-Z220 Workstation for imaging analysis (NIS, ZEN, FLOWWJO single cell analysis Software, etc...).
    - HP-Z440 Workstation for remote access imaging analysis (MATLAB, Lumerical, CompleteEASE, etc...).

Achievements & Milestones

- Membership of the Portuguese Platform of Bioimaging (PPBI).
- Node -application was submitted and accepted by the Euro Bioimaging (EuBI) platform. A proposal for ERIC membership was made and is currently being evaluated.
- Invitation to collaborative research projects to test advanced spectroscopy and imaging modes on NBI equipment with IST Lisbon, U Porto among others.

Equipment acquired

- 3D Cell Explorer Holotomography microscope from Nanolive (funded by La Caixa/ FCT project Diamond4Brain - LCF/PR/HP20/52300001).
- NANOSIGHT NS300 High resolution nanoparticle size and concentration data from Malvern Panalytical (funded by the CCDR-N via the project SbDtoolBox - NORTE-01-0145-FEDER-000047).

Courses

- Symposium on Ultrafast Sources for Bioimaging (Co-organized and hosted at INL)
- Established the "Microscopy developer Community @ Portugal monthly meetings during 2021 with participation from U Lisbon, U Coimbra, i3S, IGC, Champalimaud foundation and others, etc.)
- Offered research internships in comparative microscopies

INL in Figures

People

The last few years have been determined by the large-scale Covid-19 crisis, that has significantly impacted organisations. INL has faced challenges in enabling their employees to work productively and maintain their work commitment and engagement throughout the pandemic. The Covid-19 has created a particularly demanding environment for implementing a management plan and practices to adapt to changes occurring in the organisation on fundamental organisational behaviour areas such as (but not limited to) employee commitment, job autonomy, job stress, motivation, team processes, remote leadership, among others. In this context, these functions have acted as a critical enablers of change and as drivers of organisational adaptation and transformation.

One of the main challenges, is to deliver products and services preserving transversal consistency, yet adapted to the different realities of the different internal customers and needs. The change of role from a mere service providers to effective partners together with our internal customers must be a priority to establish a proper environment of collaboration and co-creation to design new products and services. This requires a fair partnership that not only leads to innovation but also generates positive collective energy for creating and restoring value for the organisation and its people.

In this context these units, play a key role in enabling organisational development by designing processes, providing services and advice and are intended to bring value to support INL to build capacity by designing, updating strategies and processes focused on an entire organisational system.

There is room for major transformations to manage new demands and prepare the future to make that happen by learning from global best practices and internal feedback. To this end, it is important not only confidence in our organisational potential but also to secure that we have in place the right talent aligned with INL's organisational strategy, as well as the managerial matrix skills needed to guide INLs future organisational direction and objectives. Under this context, there is a moving from a transactional role and executing strategies towards a differentiate role of influencing critical strategic enablers around talent engagement with INL strategy, leadership, cultural change, and their direct impact on INL's business growth.

The projects completed up to date and the ongoing ones, have had two main objectives: firstly, to establish a basis for managing INL's business as usual and, secondly, to prepare the Organisation for the next stage to gain maturity and stability. This transition should be done through appropriate channels of communication, dialogue and lessons learnt from past experiences.

More than 60 projects of different ranges have been developed and implemented over the period. The main business outcome is framed under the following: Digitalisation; development and updating of policies and procedures and changes in the operational model.

INL in Numbers

MPE Numbers at 31st December

	2019	2020	2021
Count	222	205	238

	2019	2020	2021
Non-Scientific Members	24%	27%	21%
Scientific Members	76%	73%	79%

Qualifications

	2019	2020	2021
Undergraduated	2%	3%	3%
Degree	12%	16%	14%
Master	23%	22%	28%
PhD	63%	59%	55%

Nationalities

	2019	2020	2021
Member States	63%	65%	68%
EU	13%	13%	11%
Non-EU	24%	21%	21%

MPE	2019	2020	2021
Number of Nationalities	31	30	34

MPA Numbers at 31st December

	2019	2020	2021
Count	164	167	194

	2019	2020	2021
Non-Scientific Members	4%	1%	0%
Scientific Members	96%	99%	100%

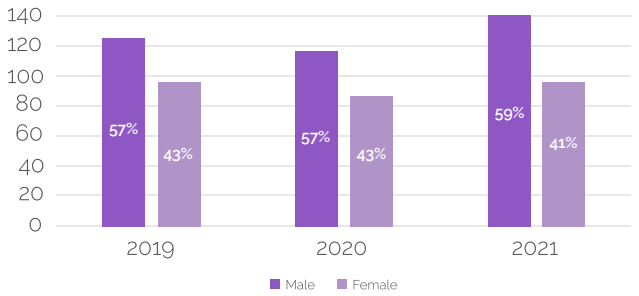
	2019	2020	2021
Member States	77%	87%	87%
EU	2%	2%	3%
Non-EU	20%	11%	10%

MPA	2019	2020	2021
Member States	12	14	12

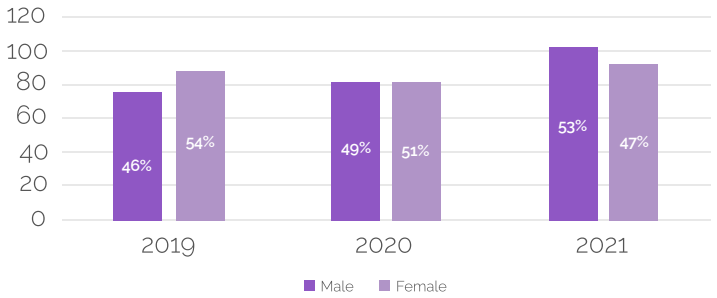
MP's	2019	2020	2021
Number of Nationalities	33	33	36

INL in Numbers

Women in Science



Gender Representation at INL



Nationalities distribution	2019	2020	2021
American		1	1
Brazilian	5	5	6
British		1	
Chinese	23	6	5
Colombian		1	
French	1	1	1
Greek			1
Indian	2	1	5
Iranian	1		1
Italian	1	1	2
Mexican		1	
Moroccan	1	1	2
Polish	1	1	2
Portuguese	120	136	157
Slovenian	1		
Spanish	7	9	11
Tunisian	1	2	
Grand Total	164	167	194

Funding

The triennium 2019-2021 was a period of surprises, with huge challenges in the world waiting for solutions, and a growth in demand for research. Challenges mean new opportunities to develop solutions, and so the global situation have given a boost to research and innovation. INL has responded to this demand for new ideas with vigour. With science and technology developing at a faster pace, INL is now better placed than ever to provide reliable solutions to global challenges.

The research and innovation framework programmes are the most important form of public funding to develop our work. Between 2019 and 2021 INL received **42.5 million €** in competitive external funding. Despite the tough competition, INL has strengthening its position as a key European actor and has positioned among the three top recipients of EU research funding with headquarters in Portugal.

INL has joined many National and European communities and promoted the participation of the research sector as a member of international initiatives and by cooperating with the European Commission. We are actively involved in the work of European public-partnership technology communities and innovation clusters from the EIT.

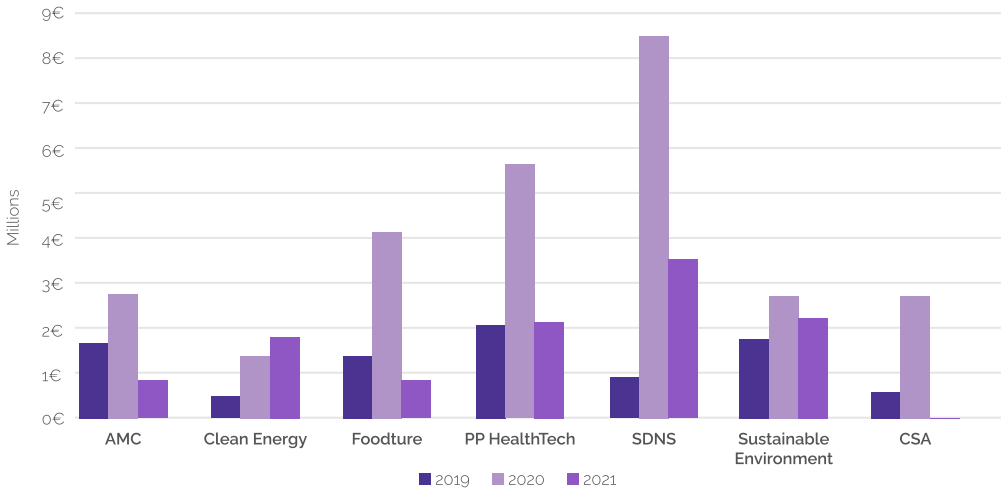
We actively cooperate with companies in projects that promote sustainable competitiveness and create new business opportunities. INL international networks drives great impact on the activities of its customers beyond individual projects by speeding up their research and product development and by strengthening their knowledge and expertise base.

Between 2019 and 2021 INL received **42.5 million €** in competitive external funding.

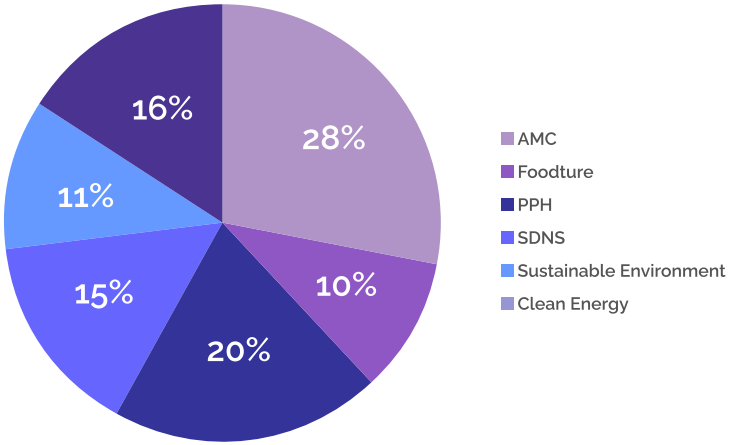
	#	Value
Institutional Grants	12	12.5 million€
Grants initiated by researchers	80	27.6 million€
Individual Fellowships	13	2.4 million€

Breakdown of Granted Projects Per Cluster

Acquired Public Funding by Cluster



Publications Distribution



Row Labels	%
Advanced Materials and Computing	12
Clean Energy	12
Foodture	13
Precise Personalised HealthTech	20
Smart Digital NanoSystems	26
Sustainable Environment	17

Breakdown of Horizon 2020/Horizon Europe Granted Projects

Between 2019 and 2020, INL received significant support for their work from the European Commission's Horizon 2020 and Horizon Europe programmes, across its three main pillars, as well as its specific objective Spreading Excellence and Widening Participation, Joint Technology Initiatives and European Institute of Innovation and Technology, significantly contributing to the overall success of INL in this programme, which amounted to **18.7 million €, 40 grants, with 17% success rate.**

Pillar	#	€
Excellence Science • European Innovation Council Future Emerging Technologies (7) • MSCA* Individual Fellowships (10) • MSCA* Research and Innovation Staff Exchange (1) • MSCA* European Researchers' Night (1)	19	5.7 million €
Industrial Leadership • Foundations for Tomorrow's Industry (7) • Integrating and opening research infrastructures of European interest (3) • Building a low-carbon, climate resilient future: Research and innovation in support of the European Green Deal (2) • For a better innovation support to SMEs (1)	13	5.4 million €
Societal Challenges • Greening the economy in line with the Sustainable Development Goals (1) • Innovative and rapid health-related approaches to respond to COVID-19 and to deliver quick results for society for a higher level of preparedness of health systems (1)	2	3.8 million €
Spreading Excellence and Widening Participation • ERA Chair Grant (1) • Twinning (1) • Widening Fellowships (2)	4	3.2 million €
Joint Technology Initiatives • ECSEL Joint Undertaking – Electronic Components and Systems	2	0.6 million €

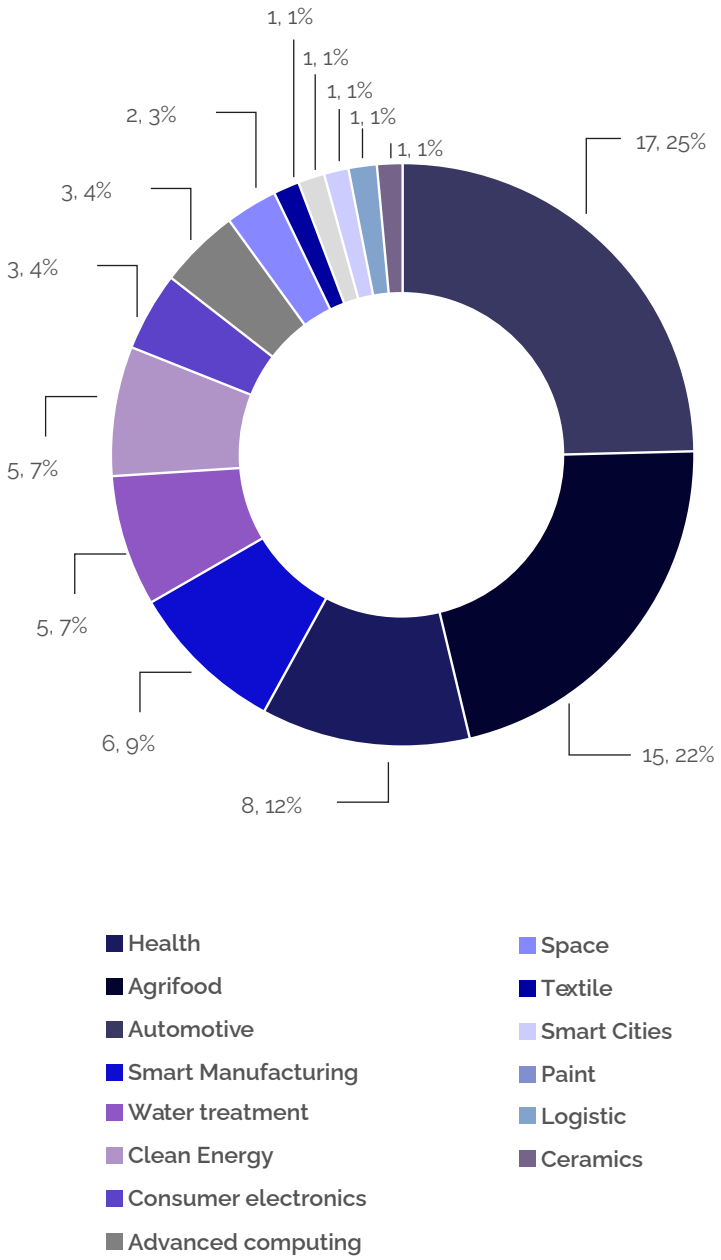
*Marie Skłodowska-Curie Actions

Breakdown of funded projects with industry

INL aims to play a leading role, at international level, in facilitating and coordinating the implementation of nanotechnology-based research programmes and projects that generate valuable compounded knowledge, products and services for the benefit of industry and society.

Between 2019 and 2021, INL had 65 ongoing funded high TRL projects with industry, 52 of which were granted during this period.

Technology Domain	Number	%
Advanced computing	1	1%
Advanced materials	8	12%
Advanced packaging	3	4%
Advanced sensors	39	58%
Bioactive food ingredients	5	7%
Nanocoatings	11	16%



Intellectual Property

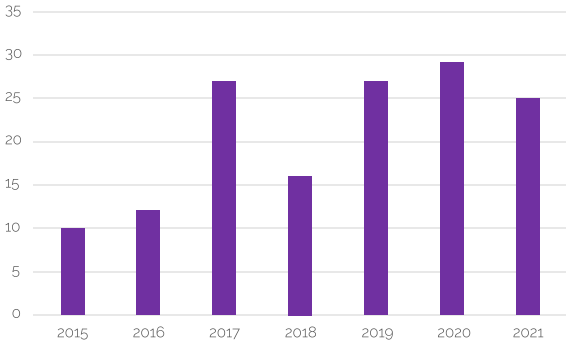
INL has the last three years amplified its efforts to create a fully Intellectual Property aware organization. The recent activities include training, implementation of IP processes and policies for cost-effective capturing and exploitation of INL's intellectual assets.
From 2020, as part of the INL 2030 strategy, a new department was formed – the *IP Exploitation & Knowledge transfer department* – with the function to deliver growth and monetization of INL's intellectual assets. IP considerations are embedded in all INLs activities, from safeguarding core INL technologies and vital background IP to value creation from innovative results in commissioned research & innovation projects, licensing or start-ups activities.
The innovation activities resulting from our research have been visible also outside INL. According to Economia Online, INL is among the ten most important patent filers in Portugal for the last 5 years, together with well-known companies like Bosch, Bial, and Novadelta.

INL is well positioned in the entrepreneurial ecosystem. INL has hosted or actively participated in numerous of workshops and acceleration programs as a promoter for deep tech entrepreneurship. INL also obtained Observer status at the World Intellectual Property Organization (WIPO) in 2020.
A strong IP portfolio is an important enabler for bringing nanotechnology solutions to the society and for creating jobs. The INL portfolio comprises patents on core technologies, trademarks protecting the INL brand and design rights covering the appearance of creative works.

Status IP Portfolio, December 2021

- #Patent families / cases:35 / 102;
- #Granted rights: 10 patent families (39 patent cases)
- #Registered trade marks 4; # Registed Design: 2

Filed patent applications per year incl. national entry and validation



The INL IP portfolio in a snapshot.

INTERNATIONAL IBERIAN NANOTECHNOLOGY LABORATORY

Nanotechnology Education and Research Demonstrations

INL IPVENTURES

Communication, Conferences & Marketing

During the triennium 2019-2021 the Corporate Communication and Marketing team addressed many challenges but it didn't stop to take new approaches on how we communicated. We've produced new interviews, developed and improved our communication channels - Scale Travels, Scale Experiences and Events. We've recorded and edited new videos, trainings and new and inspiring events. We've never been so close and apart.

During the last 3 years we've focused our attention to online and hybrid events: we managed to start doing in-person events, after the pandemic, but we continued to do them also online, due to the capacity limits of our space and the necessary precautionary measures. This is why most seminars, workshops, schools and activities organized were in hybrid format, usually using the Zoom platform.

Still, our main goal was to communicate science, build trust with all our audiences because we believe that communication plays a central role in our work, our projects and the overall INL brand.

Events

In 2019, the main events were the "Nanomed Europe 2019", the largest Nanomedicine conference in Europe, with 260 participants. The "ERC Iberian Summit" and the "Portuguese Batteries Summit" were smaller events but very strategic, Business wise.
In 2020, we organized our first hybrid event, "The Quest for Interdisciplinarity: COVID-19 Global", with a major impact on the number of participants: 1400 in total. The "Hydrogen Summit 2020" was the first full online event in which we used the Hopin platform for the first time.
2021 was a very digital year and our best year in terms of participation. High-level events and key markers set the stage for the dissemination of our efforts, including the **Green Battery Value Chain Summit** held in June as well as the **INL Battery Summit** in March.
The organization and successful implementation of the major European conference related to nanotechnology and nanoscience's, the **EuroNanoForum2021**, also brought the commitment of the European Commission towards a strong investment and support to Nanotechnology and Advanced Materials, as crucial elements of Europe's recovery and resilience with 1792 attendees and a new 3D virtual venue with virtual exhibitors and poster sessions.

Several other workshops, conferences, and events were held online during 2021 in the effort to continue our dissemination of the presence of nanotechnology in various sectors and the importance of academia, RTOs, and industrial collaborations. A four-half day online training in **'Net-zero climate emissions: The role of nanotechnologies for advanced energy generation, conversion, and storage'** was held with the purpose to provide industry and academia with the technological and scientific pathways required for the deployment of sustainable cost-effective large-scale energy storage and conversion powered by renewable energies. It sought to promote closer interaction between academia and industry while fomenting future collaborations.

Taking place in a hybrid format, the **Total Nano-Safe Hybrid Conference** was held in 2021, with the aim to strengthen research and innovation potential in nanosafety.

Microscopy at the Frontiers of Science – a biannual event organized by INL AEMIS facility, included the latest breakthroughs and unique developments in the field, nanoscale studies of biological samples and functional materials under realistic or near realistic conditions. Here, the INL facility managers and collaborators discussed how dynamical processes can be studied down to the atomic scale while taking into account the electron beam effects and how time and spatial resolutions in complex media can be extended using technical developments or artificial intelligence.

During the **TrustEat Summer School**, participants had the opportunity to learn about the theoretical and practical basics of Blockchain and how it can be applied to the agri-food sector, as well tutoring, career advice and networking activities.

A Sciencepreneurs Workshop was dedicated to the specific know-how needed to run a company from the business to the legal perspective, including an overview of Intellectual property matters.

3 Year Review in numbers

Events 2019:
3849 attendees; 57 events in total; 36 external; 21 internal; 6 general and 51 scientific

Events 2020:
8447 attendees; 61 events in total; 12 external; 48 internal; 1 general and 60 scientific

Events 2021:
12.161 attendees; 82 events in total; 39 external; 43 internal; 4 general and 78 scientific

Scale Experiences

School Visits

The triennium 2019-2021 brought challenges and obstacles that none of us has ever experienced in our lifetime. When INL closed it's doors to external visitors and schools due to COVID-19, there was a fear that it wouldn't open again. It was a difficult time and in the weeks and months that followed students and teachers kept their interest in visiting INL, learning with our Researchers and feeling inspired by science and nanotechnology.

In order to foster public engagement and improve the organisation's outreach effort at local and national level, the INL hosts regular School Visits to its premises, designed for students of elementary and high schools. The School Visits aim to:

- Increase and foster public engagement
- Communicate science to students
- Promote INL work/research
- Increase INL reputation

We have a total of 972 visits, from these 50 of then were schools, divided by the following: Braga, 16; Guimarães,2; Famalicão, 1; Viana do Castelo, 2; Amarante, 1; Porto, 16; Tavira, 1; Lisboa, 2; Vila real, 2; Coimbra, 2; Ponte da Barca, 1. 2; Spain; Other Countries, 2.

European Researcher's Night 2019-2022

2019

An event dedicated to ScienceWars – May Science be with you! is the motto and theme for a fun and engaging intergalactic battle for a more sustainable future with Science help. In this event, R & D themes that are essential for the sustainability of the planets – Health, Food, Energy, ICT and Environment – will be addressed, making a connection with the StarWars movies and with the galactic universe. During this event, which will take place at the Centro Multimeios de Espinho on September 27th and at the Serralves Foundation on September 28th and 29th, participants will be encouraged not to only to interact with researchers from different scientific areas, but also to become researchers for a day! Science and fun are the main ingredients of a diverse set of activities that include experiences, workshops, contests, networking, debates, shows, animation and more. European Researchers' Night is organized by INL and INOVA+ . In 2018 the event took place in Porto - Palácio das Artes and in 2019 was held in Espinho - Centro Multimeios.

2020

Due to COVID-19 and while public visits of the INL were not possible, we offered the possibility of learning about the multidisciplinary research and the INL facilities from the comfort of your home. Visiting INL campus online was the best way to get to know what's behind amazing scientific discoveries. Not only about our history and culture, but also about the INL community.

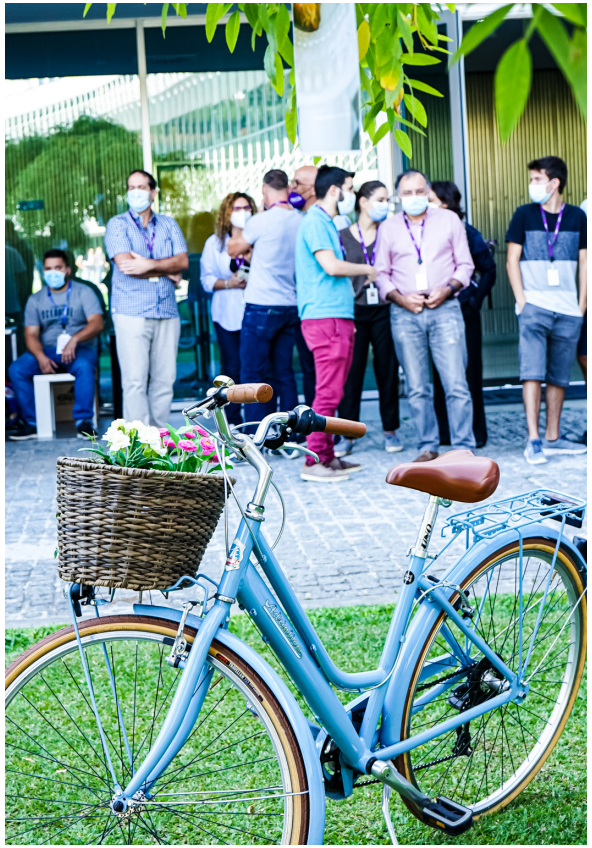
2021

In 2021, the European Researcher's Night was back on track with the 'Science for Climate' motto that framed an event committed to raising awareness about the role of science in achieving the goals of the European Green Deal. We aimed to identify major societal concerns about climate change, understand how to achieve sustainable growth, and explore the present and future solutions to tackle these challenges. The diverse programme included 'live from the lab' videos about food, water and energy, workshops about light and energy. We've also learned about the physics at the microscale, played a game that explained life cycle assessment of nanomaterials, we've shown about the importance of energy efficiency and how it can help the environment and our economy, knew a bit more about microstructures & coatings biofoulings, watched an incredible dance act by Arte Total and so many more experiments and experiences.
These were just a few of the possible applications that International Iberian Nanotechnology Laboratory (INL), and ECUM - University of Minho many other partners introduced to more than 1150 visitors 2021 European Researchers' Night, at Altice Fórum Braga.

INL Recipe Book

In 2021, during the celebrations of the World Food Day that is held every year on October 16th, we've decided to celebrate this date with the launch of a unique initiative made by INL people, a book with recipes, the INL Recipe Book: Multicultural.

This book brought together 86 delicious recipes from 30 different countries and covers everything from soups and stews, snacks and sharing plates, main dishes, pastry, doughs, cakes, and drinks. In this book, you will find recipes that have been handed down through generations, including Fesenjun, Empanada de Millo, Koshari, Himalayan Dumplings, Gemista, Bandeja Paisa, Chicken Satay and Leite Creme; as well as new creations such as Berry Mojitos, Chicken Roulade, Tuna and Sweet Potato Fritters, and Cogumelos à Bulhão Pato. For each recipe, there's a beautiful and mouth-watering photograph.



Scale Travels

Arts & Science

Scale.Travels is the INL initiative that aims at fostering a multidisciplinary and hybrid approach between science, technology and arts to innovate through creativity in nanotechnology. Launched in 2015, the Scale.Travels Residence programme aims at bringing media artists and researchers into convergence embedded in a real laboratory environment inside INL's unique facilities for a 1 to 2 weeks period.

Goals

- Spark the discussion about the social, cultural and ethical impact of nanotechnology through media arts;
- Promote collaborations between INL and other organisations and initiatives within the scope of science and media arts;
- Create novel media and digital objects based on nanotechnology leading to original experiences and unexpected products, processes and services;
- Create a critical approach to research and technological development fostering competitiveness based on knowledge and creativity

Scale Travels Residencies 2019 - 3

Microscapes, by Joanie Lemercier
Scale Travels: Wavelenghts of Light, by maotik
'Ahkromology', audiovisual installation by the Scottish artist Florence To

Scale Travels Residencies 2020 - 3

) rev (, by Pedro Tudela and João Martinho Moura
The Invention of Sense, by Marcel Weber
Approximation (tbc), by Transforma

Scale Travels Residencies 2021 - 1

Message, by Openfield

Health Environment and Safety

Policies & programmes

Year	New Documents
2019	• Occupational Health **(MP/HESM/003/0.0)** • **Chemical Spills (PI/HESM/004/0.0)** • Chemical Safety Plan **(PI/HESM/005/0.0)**
2020	• Biological Spills - PI/HESM/006/0.0 • Chemical Hazard - Potassium Cyanide Assessment • Laboratory Safety Assessment Checklist - TE/HESM/008/0.0
2021	• Freezer Storage Management - SOP/HESM/003/0.0

	2019	2020	2021
H&S Risk Assessments	3	4	-
H&S Risk Assessments	-	-	7

Emergency Area

Executed activities	2019	2020	2021
Annual Fire Drill	1	0	1
Internal Fire Drills	3	1	1
Internal Audits	3	0	0

Trainings

Trainings	Nº Sessions			Nº Participants		
	2019	2020	2021	2019	2020	2021
Fire Extinguishers & Hose Reels	23	14	22	168	62	110
Health & Safety Induction	11	8	11	176	71	141
Compressed Gas Cylinders	4	1	5	10	1	5
Chemical Warehouse & Flammable Chemicals	11	2	6	17	3	9

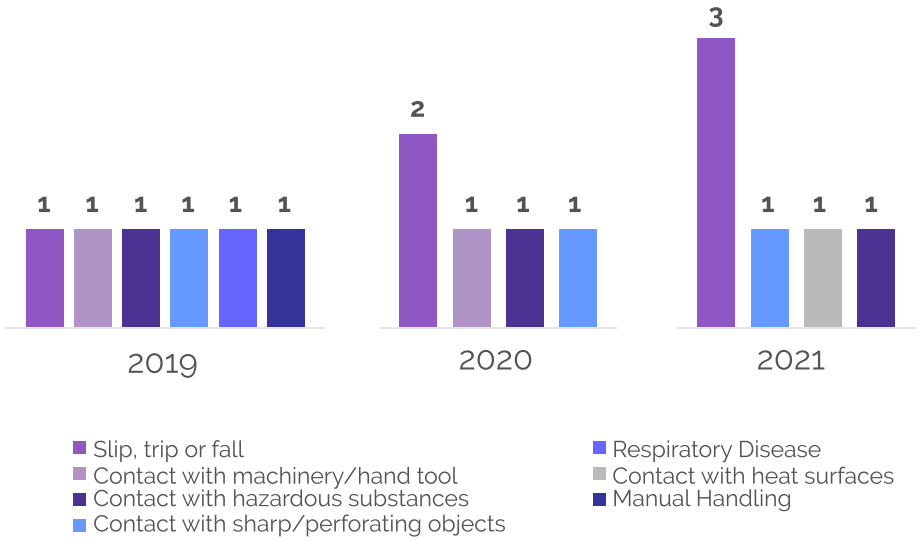
Total Number of Accidents and Incidents reported

Year	Accidents	Incidents	TOTAL
2019	5	1	**6**
2020	6	1	**7**
2021	6	0	**6**

From all the reported accidents, only one was classified as a major (accidents involving sick leave days and/or injuries). Most of the accidents occurred during laboratorial work.

Health Environment and Safety

Top Reported Acidents & Incidents Types :



Employee Involvement

In 2020 the Health Environment and Safety Unit (HES) started an annual consultation (Survey) to INLers on the "Health & Safety Perception". From the analysis of the surveys answers obtained, resulted an action plan with 12 improvement actions, from which 9 were already implement.

In 2021, the two major improvement actions resulting were:

- the creation of a digital and interactive area in the INL HUB Confluence, were INLers can easily access to the most relevant HES support materials
- the creation of support videos on different H&S topics (eg. chemical safety; ergonomics; occupational health; hazardous waste management, etc).

Safety at Work

INL has established an Occupational Health Programme with medical exams being performed by the time of admission of Members of Personnel and periodically repeated.

Occupational health	2019	2020	2021
Medical Exams Performed (admission, regular and occasional exams)	202	213	343
Pregnant INLer Workplace Risk Assessment	3	5	10

Periodically, the following parameters are evaluated:

- Legionella Monitoring (monthly)
- Noise and Illuminance Levels Monitoring (annually)
- Internal Air Quality Levels Monitoring (annually)
- Water quality (monthly)

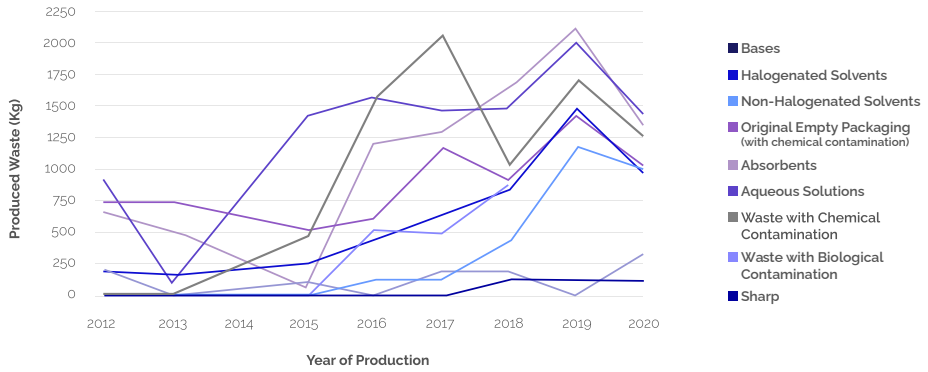
Environment Protection

Non-hazardous waste segregation, for recycling, is a general practice at INL, in line with the guidelines established within the Scale Zero programme. Several point for recyclable material: paper, plastic, glass, batteries, print tonners, are available at INL.

Hazardous Waste Management

Due to the specific research activity carried out at the INL, namely using hazardous chemicals and biological agents, it is crucial to promote the minimal production of these type of wastes and ensure all the conditions for the correct disposal of all hazardous wastes produced. In this regard strong effort is done namely by having a "Management Plan for hazardous wastes" implemented with success. Trainings (presential and digital), supply of containers for the different type of wastes, informative leaflets are examples of the existent support in this regard. Furthermore, annually and complying the Portuguese Legislation on Hazardous Wastes, the hazardous wastes produced by INL are reported to the Portuguese Agency for Environment (APA). The following graphic reflects the several classes of Hazardous Wastes produced at INL and the quantities overs the last years. The values for 2021 are not yet available.

INL Waste Production



Covid-19, Responding the Pandemic

3 Year Review

The global Coronavirus pandemic in 2020 has had a huge impact on the management of health and safety at INL. In March 2020, a big effort was required to safely transition INLers to operate remotely where possible, permitting limited mobilization to site (for essential research laboratory and building maintenance activities only) adapting all health and safety working and laboratorial research approaches accordingly.
In June and September of 2020, this was followed with a safe return to work at INL premises with gradual phases of supporting. All activities are now conducted in line with the INL Covid-19 policy and Portuguese Government's sector-specific COVID-19 guidance and Public Health Authorities.
The table below resume the key milestones and the INL response to the COVID-19 pandemic from 13th March 2020.

March 11th	Covid-19 Risk Commission was established to respond quickly to covid pandemic challenges. INL adopted measures: • A single-point of information in the INL website to disclose all measures applicable to the external community any containment measures to the target audience. • Contingency Plan first version release on March 11st • Available hand sanitizer stations in all INL areas • Available a isolation room and procedure on "how to inform about a positive covid-19 case"; • Cleaning plan of INL Campus revised to ensure a reinforced disinfection of common surfaces and critical equipment. • Internal air recirculation at INL premises has been disabled to reduce exposure (only 100% new air). • Gym classes at INL are suspended • All duty travel on behalf of INL is suspended • Remote work strongly promoted through the "Flexible Working Arrangements" • INLers are required to check the provenience of the visitors under their responsibility • INLers were required to keep a record of whom they are working/meeting (for speed up the containment/tracing in case they are getting infected) • INLers returning to INL from Risk Areas, had to report their travel and self-isolate for a 14-day period whether they had symptoms or not. • Weekly update by the Corporate Communication & Marketing Office, by email to all INlers, on the Covid-19 pandemic situation in Portugal and in the world
April 14th	• All staff to home working by, except for those staff required to operate essential INL • facilities/services. • Webinar on 14th of April where to reinforce the measures in place and share relevant tips. • General elevators will be out of service. • Established a max. nº of 2 users per area. • INL provided gloves and faceshields. • INL Risk groups were identified and applied the respective Government regulations in collaboration with the Occupational Health Services.
June 1st	In the light of the evolution of the situation, and in alignment with the planned timetable prepared by the authorities in the Host State for lifting the restrictions in Portugal: • Remote work will no longer be a mandatory requirement (except for risk groups) • Maximum number of seats will be established for the workplace area of each functional unit and laboratory, based on the rules adopted by INL for safe hysical distancing • Access to INL and delivery of services restricted and highly limited to essential services only
Sept. 14th	Changes to regulations and policies in the Contingency Plan published: • Increase in the space occupancy for all shared spaces at INL; • Mandatory use of face mask inside INL, which must be done at all times regardless of being in a shared space or in an individual space; • External visitors shall not be allowed to access INL premises.

Other Measures	• INL provided to INLers:
	  • facial masks, pocket hand sanitizer, faceshield
	  • free Covid-19 professional antigen tests
	  • ergonomic chair (important for remote work from home)
	  • digital platforms (Zoom, Microsoft Teams, Yammer)
	  • surface sanitizer in all areas
	• Implemented "covid infection prevention" signage in the building and 1 way circulation routes
	• Creation in the INL intranet of the Coronavirus area with most important information and of a scheduler for lunch (with defined time spots) and for room/lab occupation.
	• Creation of specific procedures for face-to-face trainings

INL revised INL Contingency Plan – already with 22 versions – and adjusting the measures accordingly to the actual pandemic situation.

Supporting our Employees

Other regular activities and/or conditions implemented at INL aiming a constant support of INLers:

- Gymnastic Classes at INL premises
- Gym expenses supported by the INL
- Health insurance for MPE's and personal insurance for MPA's
- Breastfeeding Room
- Medical Office
- First-aid teams
- Nursery
- Guesthouse
- Car and Bicycle parking

Quality Management

Setting the standard for Quality and Operational Excellence

INL's approach to quality and continuous improvement is to learn from best practice.
Therefore, INL Integrated Management System sets requirements for management, staff, and customer service quality that strive to meet and exceed the highest standards.
We recognize that quality is a concern of each and every one of our staff members, who are deeply involved in the deployment of our quality culture and fully committed to operational excellence and continuous improvement in order to deliver results of exceptional value.

To this end, INL is fully committed to:

- Becoming a worldwide reference on R&D oriented towards Nanoscience;
- Deploying knowledge to the business world and for the benefit of society;
- Strengthen INL sustainability through the valorisation of knowledge;
- Ensuring continuous improvement of its operational performance;
- Fostering creativity and orientation to market;
- Assuring compliance with rules and regulations.

The INL Integrated Management System is planned and defined in a manner that meets INL's strategic orientation, Quality Policy and defined Objectives - namely through the management of its processes and the adequacy of human and material resources - and in accordance with all the requirements of implemented standards, which are taken as reference for the implementation and maintenance of INL Management System.

Three Year Roadmap

Implementation of RDI Management System
2019/2020

Innovation model, supported by interfaces and interactions between the scientific and technological knowledge, the knowledge about the organization, the market and the society.

Certification of INL Integrated Management System
Jul/2020

ISO 9001:2015 Renewal
Quality standard, promotes the adoption of a process approach when developing. implementing and improving the effectiveness of a QMS, to enhance customer satisfaction by meeting requirements.

NP 4457:2006 Certification
Requirements of an effective management system for RDI, allowing organizations that adopt this standard the definition of an RDI policy in order to reach their innovation objectives.

Certification of QMS for Medical Devices ISO 13485
Oct/2020

Applicable to **design, development and testing of nanotechnology-based solutions for use in medical devices**. Specific requirements for a QMS where an organization needs to demonstrate the ability to provide Medical Devices and related services, consistently meeting customer and regulatory requirements.

Surveillance Audits | Quality, Medical Devices and RDI
2021

First surveillance audit of the RDI (May) and Medical Devices (October), as the QMS enters to a new certification cycle.

INL is one of the few RTO worldwide with QMS certification, adding the ROI and Medical Devices to the record.

Quality in numbers – 2019 to 2021

- Number of processes - **19 processes**
- Number of occurrences analysed – **total occurrences: 336**
- Number of Improvement Opportunities - **total IO: 259**
- Quality trainings – **136 trainings**
- 35 **satisfactions surveys** performed with total 1382 **participations**

Customer Satisfaction

Successful organisations have an ongoing focus on improvement, with the permanent goal of establishing and achieving high standards of performance at various levels. One of the most crucial tools to execute this goal is feedback. At INL, we look forward to getting customers, users, employees and other stakeholders to tell about how we are all doing, and actively ask for it. Besides continuous feedback, periodic surveys are launched and their results are assessed, in order to turn the information obtained into strategies and actions.

For 2021, we were able to compute all the data collected and calculate the Customer Satisfaction Rate. This global number results from the overall scores assigned to the different services (through satisfaction surveys and service desk evaluation), taking into account the total number of responses submitted. This information is key for enabling the identification of improvement areas and to work on the optimisation of INL activities.

Customer Satisfaction Rate

4.3 (on a scale of 1 to 5)

The Customer Satisfaction Rate results from the weighed average results obtained from:
Satisfaction Surveys: INL User Facilities (Internal and External Users), **Industrial Partners, Quality Management System, INL Social Services** (Cafeteria, Nursery, Guest House)
Servicedesk scores: ICS, Estate and Service, Health, Environment & Safety and CCM

Addendums

PhD Vivas

Master's Vivas

Funded Projects

Scientific Publications

INL PhD Graduates

2019

Food Processing and Nutrition

Ana Vitória de Oliveira, Probiotic bacteria in bacterial cellulose-based films, Universidade Federal do Ceará
Artur Jorge Ferreira Martins, Novel organogel systems for enhanced food structure and functionality – a multiscale approach, University of Minho
María Emilia Brassesco, Characterization of new materials for its application in the isolation and purification of macromolecules, Universidad Nacional de Rosario

Integrated Micro and Nanotechnologies

Ângela Raquel Morgado Rodrigues, Development of a self-cleaning surface of a glass cover by replication processes, University of Minho
Claudia Alexandra Araújo Coelho, Frequency modulated accelerometers, University of Minho
Eurico Esteves Moreira, Frequency modulated accelerometers, University of Minho
Vasco António Lourenço Lima, Sigma delta strategies for MEMS accelerometers and inclinometers, University of Minho

Medical Devices

Ana Cláudia da Silva Lopes, CTCs in Breast cancer, Instituto de Medicina Molecular

Nanodevices

Ana Francisca Martins, Instituto Superior Técnico

2020

Atomic Manipulation for Quantum Nanotechnology

Hongwei Miao, Alloys, Shanghai Jiao Tong University
Weidong Zhang, Metals and Alloys, Central South University
Xin Zhang, Energy Materials, Hohai University

Atomic structure-composition of materials

Birhanu Assefa Belay, 3D structures and cellular force sensors in epithelia, Tampere University of Applied Sciences

Food Processing and Nutrition

Alice Gruppi, Università Cattolica
Ana Rita Violante Pedro, Assessment of in vitro stimulatory effect of dietary supplements on intestinal cell lines and bovine intestinal epithelial cells, ICBAS - Instituto de Ciências Biomédicas Abel Salazar
Leandro Fragoso Lins, Desenvolvimento de um Produto Lácteo Probiótico de Alta Concentração e Avaliação do seu Potencial Imunomodulador / Development of a product with a high probiotic concentration with immunomodulatory potential, Universidade Federal Rural de Pernambuco
Ricardo Emanuel Silva Carvalho, Antimicrobial Peptides and Engineered Biomaterials to Fight Tuberculosis, University of Minho

Medical Devices

Rosana Maria Abreu Alves, Intracellular trafficking of nutrient transporters in mammalian cells, University of Minho

Systems Engineering

Rui Pedro Oliveira Machado, Time to Digital Conversion, University of Minho

2021

Atomic Manipulation for Quantum Nanotechnology

Liu Xie, 2D materials, University of Science and Technology of China
Qiaoxuan Zhang, Quantum transport calculations, Beijing University of Posts and Telecommunications
Wei Shen, Theoretical calculation, Wuhan University

Atomic structure-composition of materials

Ricardo Manuel Oliveira Sousa, Phase Transformations and Modelling of Thermal Stresses in a Cast Super Duplex Stainless Steel, School of Engineering of University of Porto

Food Processing and Nutrition

Maria José Arantes Costa, Development of active and smart bio-based structures at micro- and nanoscale and their use for encapsulation of bacteriophages and bioactive compounds, University of Minho

Food Quality and Safety

Monisha Elumalai, DNA biosensor based on optical detection for environmental control, University of Vigo

Integrated Micro and Nanotechnologies

Carlos Daniel Araújo Ferreira, MEMS Mirror for Automotive LiDAR Sensor, University of Minho
Carlos Filipe Brito da Silva, Micro optical tunable elements for LiDAR, University of Minho

Medical Devices

Cláudia Manuela Pinto Barata Antunes, Regulation of plasma membrane copper and nutrient transporters in yeast, University of Minho
Elisa Lenzi, Detection and imaging of single tumor cells by means of labelling with Surface Enhanced Raman Scattering (SERS), Centro de Investigación Cooperativa en Biomateriales CIC biomaGUNE

Nanochemistry

Bruna Ferreira Gonçalves, Novel printable photovoltaic systems based on Cu(In,Ga)Se2 chalcopyrite, University of Minho

Nanodevices

Catarina Raquel Fernandes Caneira, MicroPathID – Rapid in-field microfluidic system for diagnostics of pathogens, INESC - Instituto de Engenharia de Sistemas e Computadores
Maria Teresa Mêna Vieira de Oliveira, On-site activation of dual delivery systems for enhanced selectivity and biocompatibility of therapeutic systems, University of Minho

Nanomaterials for Energy Storage and Conversion

Ziyu Lu, Lithium metal anodes for high energy density rechargeable lithium batteries, China University of Geosciences Beijing

Nanomedicine

Lourdes Valdivia Fernández, Development of lipid-based drug delivery systems for the treatment of diseases, University of Cantabria

Natural and Artificial Photonic Structures and Devices

Paula Martinez Perez, Development and optimization of experimental protocols for biosensing employing optical porous transducers, UP València

Theory of Quantum Nanostructures

Ricardo Ortiz, Electronic and spin properties of open-shell nanographenes, Universidad de Alicante
Noel García Martínez, Functionalized graphene bilayer for quantum technologies

2D Materials and device

Balaji Sompalle, Fabrication of photodetectors based on 2D van der Waals heterostructures, University of Minho
Rabiaa Elkarous, Photodetector based on graphene and other 2D materials, University of Tunis El Manar

INL MSc Graduates

2019

Food Processing and Nutrition

Cátia Isabel Barbosa Sampaio, Production and characterization of nanoencapsuled essential oils: study of its stability and antimicrobial activity, University of Minho
Leonor Vieira Carneiro, Development of fibrillar food-inks for alternative meat applications, School of Engineering of University of Porto
Lidia Leonize Rodrigues Matias, Tamarind trypsin inhibitor in nanoparticles of chitosan-isolated whey protein: in vitro digestibility and effect on rats overfed with a high glycemic index diet, Universidade Federal do Rio Grande do Norte
Maria João Moutinho Lopes Martins, Development and characterization of a novel bio-based microencapsulated phase change material, University of Minho
Rafael Oliveira de Araújo Costa, Safety and Potential Clinical Application of Nanoparticles Loaded with a Trypsin Inhibitor Isolated from Tamarind Seeds (Tamarindus indica L.), Universidade Federal do Rio Grande do Norte

Integrated Micro and Nanotechnologies

Daniel Simek, Magnetic microvalve actuator, Brno University of Technology
Inês Garcia, Acelerómetro MEMS de Alta Precisão para Micro-satélites, University of Minho
Inês Sofia Moreira Garcia, High Precision MEMS Accelerometer for Microsatellites, University of Minho
João Luís Pereira, Biomimetic self-cleaning polymer surfaces, University of Minho
Sérgio Tiago Silva Pereira, Implementation and characterization of temperature microsensors for incorporating in a polymeric microfluidic device for drug nanocarriers systems, University of Minho

Medical Devices

Ana Beatriz Braçal Marques do Patrocínio, From Lab to Industry: a Scale-up Framework for a Medtech Startup, FCT – Nova University of Lisbon
Ana Cláudia da Silva Lopes, Her2 in CTCs, University of Minho
Joana Margarida Faria Rocha, CTC isolation
Kevin Bernardo de Oliveira, SERS-based single cell phenotyping in droplets, School of Science, Nova University of Lisbon
Pedro Miguel Quintas da Conceição, Sensorised bioreactor, University of Minho
Rita dos Santos Natividade, The study of human copper transporters using advanced microscopy techniques, University of Minho

Nanodevices

Alexandra Maria Pinto Cunha, A Phage-Based Biosensor for Detection of Nosocomial Infections, University of Minho
António José do Nascimento de Oliveira, Nanoparticles in Cu(In,Ga)Se2 thin film solar cells for light trapping, FCT – Nova University of Lisbon
João Pedro Coias Vieira, Optical coherence tomography for the evaluation of vulnerable plaques with nanoprobes, FCT – Nova University of Lisbon

Nanofabrication for optoelectronic applications

Rodrigo Miguel Madaleno Ribeiro, Lithography for sub-micrometer, FCT – Nova University of Lisbon
Sara Cristina Pereira Fonseca, Evaluation of atherosclerotic plaques with nano-probes for intravascular cardiological imaging diagnosis, FCT – Nova University of Lisbon

Nanomaterials for Energy Storage and Conversion

Yue Li, High performance cobalt-based phosphide catalysts for electrochemical water splitting, University of Minho

Nanomedicine

Ana Filipa Martins de Sousa Matos Ramalheiro, Microneedle arrays loaded with lipid nanocarriers for the sustained delivery of immunomodulatory drugs, Instituto Superior Técnico
Cátia Daniela Figueiredo Martins, Synthesis of peptidic sequences especific for GranzymeB, University of Minho
Catia Rocha, University of Minho
Joana Margarida Dias Domingues, Inhaled therapeutic strategies for cystic fibrosis-associated infections using nanoparticles-based drug delivery, University of Minho
Raquel da Costa Rainha Gonçalves, Synthesis and in vitro eveluation of novel BODIPY fluorophores, University of Minho

Natural and Artificial Photonic Structures and Devices

Ana Alejandra Santiago González, Microalgae photonic properties, University of Santiago
Pedro Pereira, 2DM integration into photonic cavities, University of Minho

Precision Medicine

Daniele Paesani, Development of NMR probe, University of Torino
Teng Zhang, Time-domain NMR studies on red blood cells, University of Minzu
Xiaofang Li, Time-domain NMR studies on red blood cells, University of Minzu

Theory of Quantum Nanostructures

Henrique Guimarães Silvério, Implementation of Gate Set Tomography on Quantum Hardware, Universidade de Lisboa

Ultrafast bio- and Nanophotonics

Carlota Pereira de Almeida Carlos, Plasmonic hybrids, University of Aveiro
Pedro Alexandre Aparício de Moura, Simulation and optical characterization of energy efficient nanoscale light-emitting diodes, Nova University of Lisbon

2D Materials and devices

João Francisco Pissarra Correia Maduro dos Santos, Optimization of the chemical vapour deposition conditions for the growth of atomically thin MoSe2 as photoresponsive material, IST
Lucas Morais Baptista, Graphene Transistors for radio-frequency applications, University of Minho
Telma Campos Domingues, Understanding DNA-DNA interactions using graphene transistors, University of Minho

2020

Atomic Manipulation for Quantum Nanotechnology

Liuliu Han, Central South University
Rui Zhou, Central South University

Atomic structure-composition of materials Food Processing and Nutrition

Ana Isabel Paupério Mendes Ribeiro, Co-axial bioprinting of edible microstructured bioinks for cell-based meat applications, Instituto de Ciência
Beatriz Sousa Afonso, Scale-up production of food grade nanoparticles aiming their application in food products, University of Minho
Catarina Alexandra Fortuna dos Santos Miranda, Integrative study on the development of microparticles for oral drug delivery: processing and characterization through biotribology and molecular dynamics analysis, University of Minho
Nuria Pizarroso Álvarez, encapsulación de peptidos saciantes en nanoparticulas de proteina/alginato sensibles a tripsina, Universidad Francisco de Vitoria
Patrícia Rodrigues, Modification of polydimethylsiloxane (PDMS) to reduce the absorption of small molecules by analytical microfluidic devices, University of Minho
Pilar Vega Herrero, n/a, Univ. De Zaragoza
Ricardo Cardoso, Development of low-cost peripherals for the operation of microfluidic devices, Faculty of Engineering, Porto University
Tiago Cardoso Conde Pinto, Oleogels as a tool for delivery of bioactive compounds in foods, School of Engineering of University of Porto

Medical Devices

Elisa Hysaj, Multi-cell culture on microfluidic device, University of Pisa
José Maria Duque Neves Gouveia Fernandes, past, Nova University of Lisbon
Luís Carlos Real Carreira, Development and optimisation of point-of-care optofluidic devices for the rapid detection of genetic material, School of Engineering of University of Porto
Selma Alouach, Development of a Metastasis-on-a-chip system to study the invasive capacity of patientderived Circulating Tumor Cells, University of Montpellier

Nanochemistry

Arnaldo Filipe Gouveia Espírito Santo Neto, Development of N-doped carbon catalysts for simultaneous NO and CO reduction, School of Engineering of University of Porto

Nanodevices

Maria Margarida da Silva Costa Barros, Monoolein cubosome formation using solvent-exchange in bulk and microfluidics: the effect of DODAB and DDAB addition, University of Minho
Rita Cacho, Microfluidic –based isolation and functional characterization of isolated rare-tumor associated cells in prostate cancer, University of Minho
Xhorxhina Saulli, Exploring Polycation-DNA complexation for gene delivery using Fluorescence Cross-Correlation Spectroscopy, Faculty of Science University of Porto & SERP+ Erasmus Mundus MSc fellow

Nanofabrication for optoelectronic applications

André Filipe Ferreira Violas, Novel Rear Contact Architectures in CIGS Solar Cells: Modelling and Experimental Fabrication, Nova University of Lisbon
João Ricardo da Silva Barbosa, Point contact structures for Thin Film Solar Cells, FCT – Nova University of Lisbon

Precision Medicine

Maria Beatriz Vieira Andrade, A GWAS on Glioblastoma, University of Porto
Tiago Miguel Crista Sardo, Microfluidic chip design and simulation for Glioblastoma, School of Engineering of University of Porto

Ultrafast bio- and Nanophotonics

Ânia Barata Micaelo, Intracellular sensing during photo thermal therapy, University of Minho

Water Quality

Ana Sofia Pontes Castanheiro, Bioaccumulation and toxicology of nanomaterials used by the plastic industry in marine mussels, University of Minho

2D Materials and devices

Elisabete Cristina Loureiro Fernandes, Fabrication of Photodetector Arrays Based on Amorphous Silicon Technology, University of Minho
Jiri Severa, 2D materials for quantum technologies, Brno University of Technology
Teresa Isabel Loureiro Fidalgo do Vale Rodrigues, Assessment of graphene transistors for measurement of stroke relevant biomarker cutoff value, University of Minho

2021

Atomic Manipulation for Quantum Nanotechnology

Shijie He, Synthesis of 2D materials, Southwest University

Food Processing and Nutrition

Débora Lemos Gadelha de Oliveira, Bigels loaded with antimicrobials and antioxidants for the extension of food shelf life, University of Minho
Inês Araújo Parente, Development of a new Colon-Host simulator. Optimization of the cell-based module, University of Minho
Patrícia Martins Rodrigues, Development of microfluidic-based tools to mimic the human gastrointestinal tract, University of Minho
Yolanda Patrícia Manuel Leopoldo, Microencapsulation of bacteriophages against food pathogens for oral administration to ruminants, University of Minho

Food Quality and Safety

Aitor García, Development of a miniaturized device based on dna and graphene field effect transistors for varietal identification of grapes in d.o. Douro and Porto, University of Santiago de Compostela
Ana Alexandra da Costa Ribeiro, Evaluation of the potential risk associated to the presence of antibiotic resistant microorganisms in food products, Escola Superior de Saúde do Politécnico do Porto
Carla Isabel Cunha Teixeira, DNA extraction and purification from vegetal and wine samples combining microscale solid phase extraction (μSPE) and microfluidics., University of Minho
Estefânia Inês Agostinho Mendes de Almeida, Development of fast methods for the detection of patulin producing fungi, University of Minho
Rofer Zott do Nascimento Machado, Development and evaluation of a microfluidic device to probe wine authenticity by DNA extraction and isolation, University of Minho
Saioa Gomez Rocal, Development of a miniaturized device to for isothermal DNA amplification and its application in the detection of spoilaged microorganisms in commercial fruit preparation, University of Santiago de Compostela

Integrated Micro and Nanotechnologies

Inês Vilas Boas de Castro, Development and optimization of microfluidic devices for blood plasma separation and other biological components, University of Minho

Laboratory for Nanostructured Solar Cells

Daniel Brito, Growth and characterization of Cu(In,Ga)Se2 thin film for solar cells by pulsed hybrid reactive magnetron sputtering, University of Minho
Pedro Santos, Growth and characterization of Cu(In,Ga)Se2 thin film for solar cells by pulsed hybrid reactive magnetron sputtering, University of Minho

Medical Devices

Adriana Filipa Ribeiro Carneiro, CTCs in CRC, University of Coimbra
Ana Sofia Oliveira Martins, Development of a metastasis-on-a-chip system to study the invasive capacity of patient-derived circulating tumor cells, Universidade minho
Armando Martins da Nova Dias, Intracellular RNA detection by SERS, University of Minho
Carolina Passos Rodrigues, An integrated liquid biopsy microfluidic device for the isolation, recovery, encapsulation and sorting of circulating cancer cells, University of Minho
Daniel António Martins André, Resistive pulse nanopore sensing of nanoparticles – steps towards physical detection of viruses, FCT – Nova University of Lisbon
Frederico Henriques Antão Mendes Tremoço, Heating of Atomic Force Microscopy (AFM) cantilevers operating in liquid media under intense optical illumination, FCT – Nova University of Lisbon
Jéssica Patrícia Azevedo Pinto, Study of the metabolic conditions involved in monocarboxylate transporter MCT1 internalization in human cancer cell lines, University of Minho
Madalena Rosa Correia Calado, Pressure-Driven Resistive Pulse Nanopore Sensing for the Characterization of Extracellular Vesicles, FCT – Nova University of Lisbon
Maria Madalena Sousa da Silva, Preclinical validation of an Optofluidic system for the detection of Minimal Residual Disease in Acute Myeloid Leukemia, University of Minho
Micaela Tavares Oliveira, Electrochemical pH monitoring in cell culture systems, University of Minho
Ricardo Neto Pereira, Cancer single-cell encapsulation and proliferation monitoring in microdroplets, University of Minho

Nanochemistry

Dinis Correia Mota, Functional Coatings, School of Engineering of University of Porto
Sara Raquel Ferreira Gomes, Heavy metals adsorption, School of Engineering of University of Porto

Nanodevices

Diogo da Silva Gomes, Microfluidics as nanoassemblers of soft self-assembled nanocarriers for drug delivery, University of Minho
Luís Miguel Santos Dias, Microfabrication of a microfluidic device for cell sorting: isolation of both circulating tumor cells and giant cancer-associated macrophage-like cells (CAMLs) , University of Minho

Nanofabrication for optoelectronic applications

Célia Rocha, Electrical and OpticalCharacterization of Ultrathin Solar Cells, FCT – Nova University of Lisbon
Diogo Xavier da Cruz Amaral, Células solares baseadas em Cu(In,Ga)Se2 : o impacto da metaestabilidade ativada por recozimento pós-crescimento, University of Aveiro
Margarida Marques Manos Coelho Monteiro, Dielectric materials as new approach for CIGS front passivation, FCT – Nova University of Lisbon
Xavier Alexandre Leitão Pinheiro, Development of nanolaminates for carrier selectivity, University of Coimbra

Nanomaterials for Energy Storage and Conversion

Renata Palowska, Transition metal phosphide nanostructures for water splitting and electrochemical sensing, Jagiellonian University

Nanomedicine

Teresa Sousa Pereira, Towards injectable theranostic platforms: tunable peptide-based supramolecular hydrogels with drug-delivery, MRI reporting and hyperthermia capabilities, University of Minho
Vânia Catarina da Silva Costa, Preclinical testing of theranostic graphene-based magnetic nanocarriers in 2D and 3D hepatocellular carcinoma models, University of Minho

Nanostructured Materials

Tiago Miguel Pereira Rebelo, Ferroelectric thin film nanostructures by laser ablation, University of Minho

Precision Medicine

Andre Gusmão Topa Soares Alves, Development of arduino-based spectrometer, Aarhus University

Quantum and Linear-Optical Computation

Alexandra Francisco Ramôa da Costa Alves, Learning the physics of open quantum systems from experiments, University of Minho
Ana Filipa Gonçalves de Carvalho. Simulating linear-optical quantum computers, University of Minho
Mafalda Francisco Ramôa da Costa Alves, Ansätze for Noisy Variational Quantum Eigensolvers, University of Minho

Ultrafast bio- and Nanophotonics

Beatriz Costa, Microengineered Scaffolds for Three- Dimensional Cell Culture Applications, University of Minho
Beatriz Neves Leal Costa, Design and Fabrication of 3D microstructures for cell interaction studies in the field of hematologic malignancies, University of Minho
João Carlos Roberto de Freitas, Photonic Nearfield Effects Applied to Real- Time Biosensing Super Resolution Bioimaging, University of Minho
Luís Manuel Mano da Costa, Functioanlization of nanodiamonds for neuronal sensing, University of Minho

Water Quality

Samuel Araújo Silva, Development of an electrochemical sensor for detection of organic water contaminants (Atrazine) based on molecular imprinted polymers, University of Minho

2D Materials and devices

Daniel Miranda, Laser patterning on transition metal dichalcogenides thin films, University of Minho
Diogo Poeta Miguens, Extraordinary transparency in continuous metallic thin films, University of Minho
João Henrique de Castro Fernandes, Large-scale, controlled growth of two-dimensional materials by chemical vapor deposition, University of Minho
Lucas Rocha da Silva, Fabrication and characterization of suspended graphene membranes, University of Minho
Mafalda Inês Gonçalves de Abrantes, Graphene field-effect transistors functionalization for neurotransmitter biosensing, University of Minho
Rabiaa Elkarous, Phtodetectors based on graphene and other 2D materials

INL PROJECTS 2019-2021

Atomic structure-composition of materials

- CryoEM-PT Central Node – Rede Nacional de Microscopia Eletrónica Avançada para as Ciências da Saúde e da Vida – Implementação do Nó Central através da aquisição de um Crio-Microscópio Electrónico, funded by ON2, 2021-05-01 – 2023-04-30, Paulo Ferreira
- msCORE – Multiscale methodology with model order reduction for advanced materials and processes, funded by Portugal, 2018-07-02 – 2022-07-01, Paulo Ferreira
- Soft4Sense - Smart Surfaces for Reliable Tooling Integration, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-04-01 – 2023-03-31, Paulo Ferreira
- USECoIN – Understanding the Structure Evolution of Seedless Copper Interconnects for Nanoelectronics, funded by Portugal 2020, 2018-09-01 – 2021-12-31, Paulo Ferreira

Food Processing and Nutrition

- 2020.03447.CEECIND – Healthy-gut: Effect of functional diet on intestinal microbiota health, funded by FCT, 2021-04-14 – 2027-04-14, Ana Isabel Bourbon
- 3D NEONET – Drug Discovery and Delivery NEtwork for ONcology and Eye Therapeutics, funded by Horizon 2020, Marie Skłodowska-Curie actions, 2017-01-16 – 2021-01-15, Lorenzo Pastrana
- 3D-NANOFOOD, funded by Horizon 2020, Marie Skłodowska-Curie actions, 2020-03-16 – 2024-03-14, Miguel Cerqueira
- Antiviral edible coating for fresh food, funded by EIT – European Institute of Innovation and Technology, 2020-08-01 – 2020-12-31, Lorenzo Pastrana
- ARMA4VESPA – Armadilhas e iscos seletivos para eliminação da Vespa velutina, funded by Institute of Funding for Agriculture and Fisheries – Portuguese Ministry of Agriculture and Sea, 2016-09-01 – 2019-08-30, Miguel Cerqueira
- Better Plastics – Plastics in a circular economy, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-06-30 – 2023-06-30, Miguel Cerqueira
- BetterFat4Meat – Desenvolvimento de gordura estruturada para utilização em produtos cárneos por substituição de gordura animal, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2019-09-01 – 2022-11-30, Lorenzo Pastrana
- cLabel+: Alimentos inovadores "clean label" naturais, nutritivos, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-07-01 – 2023-06-30, Miguel Cerqueira
- CRYSTAL3 – Commercial & Research Opportunity for Cysteinyl Leukotriene Signalling in Ocular & CNS, funded by Horizon 2020, Marie Skłodowska-Curie actions, 2021-01-01 – 2014-12-31, Lorenzo Pastrana
- CVMar +i – Inovação industrial através de colaborações específicas entre empresas e centros de investigação no contexto de valorização biotecnológica marinha, funded by INTERREG POCTEP, 2017-07-01 – 2020-12-31, Miguel Cerqueira
- EnhanceMicroAlgae – High added-value industrial opportunities for microalgae in the Atlantic Area, funded by INTERREG Atlantic, 2017-11-01 – 2021-10-30, Lorenzo Pastrana
- FlexFunction2Sustain – Open Innovation Ecosystem for Sustainable Nano-functionalized Flexible Surfaces, funded by Horizon 2020, NMBP - Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing, 2020-04-01 – 2024-03-31, Pablo Fucinos
- FODIAC – Foods for diabetes and cognition, funded by Horizon 2020, Marie Skłodowska-Curie actions, 2018-04-02 – 2023-03-31, Lorenzo Pastrana
- GASTRIC – Gastrointestinal Tract on Chip - An automated microfluidics-based modular device for complete simulation of the processes of digestion and absorption of orally ingested bioactive compounds, funded by Horizon 2020, Marie Skłodowska-Curie actions, 2020-10-16 – 2022-10-15, Miguel Xavier
- hOLIVEcream – Healthy olive oil based creams

enriched with berries for application in bakery and pastry, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2021-09-01 – 2023-06-30, Miguel Cerqueira

- ICECARE – Gelados funcionais cardio-saudáveis, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-03-01 – 2023-06-01, Lorenzo Pastrana
- M2atD – A 3D bioprinted model for cell-based meats design, funded by The Good Food Institute, 2020-05-01 – 2022-05-31, Sara Oliveira
- MICRODIGEST – Micro-device for human gastrointestinal tract simulation, funded by Portugal 2020, 2018-07-16 – 22-02-28, Catarina Gonçalves
- MobFood – Mobilização de conhecimento científico e tecnológico em resposta aos desafios do mercado agroalimentar, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2017-12-01 – 2021-05-31, Miguel Cerqueira
- NanoBioSensor – desenvolvimento de nanosensores para avaliação da qualidade microbiológica de produtos à base de fruta, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2018-07-01 – 2022-06-30, Lorenzo Pastrana
- NANOXYPACK – Nano-sized oxygen scavenger for new active food packaging, funded by Portugal 2020, 2018-07-01 – 2021-12-31, Miguel Cerqueira
- PACKTERIOPHAGE – Bacteriophage-releasing nanostructured smart packaging materials for the control of food-borne pathogens, funded by Portugal 2020, 2018-07-16 – 2022-07-15, Pablo Fucinos
- PhageSTEC – Encapsulated bacteriophages for pre-slaughter interventions to reduce to Shiga toxin producing, funded by Portugal 2020, 2018-07-26 – 2021-12-21, Pablo Fucinos
- RE-EAT – Estratégias de recuperação da capacidade de amadurecimento no pós-armazenamento da pêra rocha, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2019-10-01 – 2022-12-31, Lorenzo Pastrana
- TrustEat – Building a trusty future food system by using blockchain tech, funded by Horizon 2020, WIDESPREAD - Spreading Excellence and Widening Participation, 2020-10-01 – 2023-09-30, Lorenzo Pastrana
- YPACK – High performance polyhydroxyalkanoates (PHB) based packaging to minimise food waste, funded by Horizon 2020, SC2 - Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy, 2017-11-01 – 2021-04-20, Miguel Cerqueira

Food Quality and Safety

- DETECTR – CRISPR technology against the COVID-19 pandemic. The DETECTR of SARS-CoV-2, funded by FCT, 2020-07-09 – 2021-01-08, Alejandro Garrido
- ICONSS – Innovative Consumer OrieNted Safe Solutions, funded by EIT – European Institute of Innovation and Technology, 2020-04-01 – 2020-12-31, Marta Prado
- LAMP-Light in the diagnosis of COVID-19, funded by FCT, 2020-06-01 – 2020-08-31, Alejandro Garrido
- NANOEATERS – Transferencia y valorización de nanotecnologías a PYMES innovadoras (early adopters) de la Eurorregión, funded by INTERREG POCTEP, 2017-07-01 – 2021-04-05, Marta Prado
- PORTGRAPHE – Control of Port and Douro Wines authenticity using graphene DNA sensors, funded by Portugal 2020, 2018-06-15 – 2022-06-14, Marta Prado
- Seafood Age – Smart and eco-innovative SEAFOOD processes and products for healthy AGEing, funded by INTERREG Atlantic, 2019-05-02 – 2022-11-01, Marta Prado

Integrated Micro and Nanotechnologies

- (LINK4S)ustainability – A new generation connectivity system for creation and integration of networks of objects for new sustainability paradigms, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-07-01 – 2023-06-30, Filipe Alves
- 4NoPRESSURE – Desenvolvimento de vestuário inteligente para a prevenção da ocorrência de úlceras de pressão, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-06-01 – 2023-06-30, Rosana Dias
- BOSCH – Sensitive Industry, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-11-03 – 2023-06-30, Diogo Aguiam
- Cat4GtL – Continuous Catalytic reactor for the Gas-to-Liquid process using NETmix technology, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-09-01 – 2023-06-30, Patrícia Sousa
- CELINOV – Novas soluções para o automóvel do future, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-02-01 – 2023-01-31, Diogo Aguiam
- CleanTumor – Electromagnetic probe for optimized complete tumor resection, funded by Portugal 2020, 2018-07-23 – 2022-02-28, José Fernandes
- FDPanel – Future Door Panel, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-10-01 – 2023-06-30, Diogo Aguiam
- i4REV – Desenvolvimento de Revestimentos Nanoestruturados para Funcionalização de Superfícies de Peças Automóveis, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-02-19 – 2023-02-18, Patrícia Sousa
- I-MECH – Intelligent Motion Control Platform for Smart Mechatronic Systems, funded by Horizon 2020, ECSEL - Electronic Components and Systems for European Leadership, 2017-06-01 – 2020-05-31
- IMOCO4.E – Intelligent Motion Control under Industry 4.E, funded by Horizon 2020, ECSEL - Electronic Components and Systems for European Leadership, 2021-09-01 – 2024-08-31, Rosana Dias
- INSENSE – Nova Geração de Tecnologias de Integração e Encapsulamento de Sensores, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2016-10-01 – 2019-06-30, João Gaspar
- ITEC Smart Automation I4.0, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-06-01 – 2023-06-01, André Cardoso
- JigSense - Sensorização inovadora de gabaritos para linhas de produção, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2019-10-01 – 2022-09-30, Pedro Matos
- NANOEATERS – Transferencia y valorización de nanotecnologías a PYMES innovadoras (early adopters) de la Eurorregión, funded by INTERREG POCTEP, 2017-07-01 – 2021-04-05, João Gaspar
- NIMAS – New Active Medical Implants, funded by Portugal 2020, 2018-07-23 -2021-12-31, Alar Ainla
- Progressive Dies 4.0, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-06-01 – 2023-05-31, Rosana Dias
- SMART4CAR - Smart Surfaces for Automotive Components, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2019-10-01 – 2022-09-30, Patrícia Sousa
- TOP4ICT – Tooling OPtimization for ICT Systems, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2019-08-01 – 2022-07-31, Filipe Alves
- uMEMS – MEMS de filme fino de silício em electrónica para aplicações de sensores pervasivas, funded by FCT, 2016-01-01 – 2019-06-30, João Gaspar
- uPGRADE – Miniaturized Prototype for GRavity field Assessment using Distributed Earth-orbiting assets, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-07-01 – 2023-06-29, Rosana Dias
- VINCI 7D - Functional Print, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-08-02 – 2023-08-02, Vinaya Basavarajappa

Laboratory for Nanostructured Solar Cells

- ARCIGS-M - Advanced aRchitectures for ultra-thin high-efficiency CIGS solar cells with high Manufacturability, funded by Horizon 2020, 2016-12-1 – 2020-11-30, Sascha Sadewasser
- CIGNUS – CuInGaSe Nanowires Under the Sun, funded by Horizon 2020, Marie Skłodowska-Curie actions, 2019-11-01 – 2021-10-31, Sascha Sadewasser
- LA2D – Large area two dimensional heterostructures for photodetectors, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2016-07-01 – 2019-12-31, Sascha Sadewasser
- MiconCell – Micro-concentrator thin film solar cells, funded by Portugal 2020, 2018-07-01 – 2022-06-22, Sascha Sadewasser
- STAR-Sol – Semi-transparent solar cells for building-integrated photovoltaics, funded by FCT, Cooperation Programme in Science and Technology between Luxembourg and Portugal, 2019-07-15 – 2022-07-14, Sascha Sadewasser
- UL-Flex-Cell – High-performance, ultra-light flexible CIGS Solar Cell, funded by Horizon 2020, Marie Skłodowska-Curie actions, 2021-01-01 – 2022-12-31, Sascha Sadewasser

Medical Devices

- BIOCELLPHE – Ultrasensitive BIOsensing platform for multiplex CELLular protein PHEnotyping at single-cell level, funded by Horizon 2020, FET - Future Emerging Technologies, 2021-04-01 – 2025-03-31, Sara Abalde
- CTC-OncoDynamics – Phenotyping Circulating Tumor Cells to monitor cancer dynamics, funded by La Caixa Foundation, 2020-06-01 – 2022-05-31, Lorena Diéguez
- CULTURE – Platform for the detection of multidrug resistant organisms and the management of information associated to infectious episodes, funded by Horizon 2020, ICT - Information and Communication Technologies, 2020-03-17 – 2020-06-08, Pieter De Beule
- CULTURE (Phase II) – Platform for the detection of multidrug resistant organisms and the management of information associated to infectious episodes, funded by Horizon 2020, ICT - Information and Communication Technologies, 2020-09-06 – 2021-03-19, Pieter De Beule
- HighSenseCoV2 – Highly sensitive immunoassay for SARS-CoV2 detection using new amplification technology, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-12-01 – 2021-12-31, Lorena Diéguez
- IMPact-L – Innovative Microfluidic Platform for Analysis of myeloid Leukemia blasts, funded by Portugal 2020, 2018-07-16 – 2021-12-31, Lorena Diéguez
- METASTARG – Targeted multifunctional nanoemulsions to interrupt metastatic progression, funded by ERA-NET, 2019-05-01 – 2022-04-01, Lorena Diéguez
- PortASAP – European network for the promotion of portable, affordable and simple analytical platforms, funded by COST - European Cooperation in Science and Technology, 2017-10-03 – 2021-10-02, Lorena Diéguez
- PROMISE – Bioprinted hydrogel microfluidics to mimic patient-specific tumor metastatic microenvironment, funded by La Caixa Foundation - Health Research Programme, 2020-12-01 – 2023-11-30, Lorena Diéguez
- SAM – Simultaneous Advanced Microscopies, funded by Portugal 2020, 2018-10-01 – 2022-03-31, Pieter De Beule
- SENTINEL – Novo biosensor injectável para monitorização continua remota de pacientes oncológicos com elevado risco de recidiva, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-04-01 – 2023-04-01, Lorena Diéguez
- SERS4COVID19 – Developing a portable SERS chip for point-of-care analysis of virus-specific nucleic acid, funded by FCT, 2020-06-01 – 2020-08-31, Lei Wu

Nanochemistry

- Biopaint – Tinta de base natural, energeticamente eficiente e com propriedades funcionais distintivas direcionada ao setor automóvel, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2021-03-01 – 2023-06-30, Juliana Sousa
- CO2COFs – New Heterogeneous Catalyst Materials for Hydrogenation of CO2 to Formic Acid: Metallophthalocyanine-Based 2D- and 3D Covalent Organic Frameworks, funded by Horizon 2020, Marie Skłodowska-Curie actions, 2019-07-01 – 2022-06-30, Jenni Jarju
- COFforH2 – Redes Organicas Covalentes como metaloenzimas artificiais para ativacao de hidrogenio, funded by FCT, UTAustin Portugal Program, 2020-11-01 – 2021-12-31, Laura Salonen
- CritCat – Towards Replacement of Critical Catalyst Materials by Improved Nanoparticle Control and Rational Design, by Horizon 2020, NMBP - Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing, 2016-06-01 – 2019-05-31, Yury Kolen'ko
- CritMag – REEs-free high-performance permanent magnets based on exchange-spring and high anisotropy phases. Funded by Portugal 2020, 2018-07-26 – 2022-01-25, Yury Kolen'ko
- MAREWIND – Materials solutions for cost Reduction and Extended service life on WIND off-shore facilities, funded by Horizon 2020, NMBP - Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing, 2020-12-01 – 2024-11-30, Yury Kolen'ko
- NanoCatRed - Novel metallic, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-06-01 – 2023-05-31, Yury Kolen'ko
- NanoLACCA – Development of nano-polimeric opaque and translucent top coats, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2018-09-01 – 2021-02-28, Juliana Sousa
- pBio4.0 – Prevenir o Biofouling em Sistemas de membranas, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2018-07-01 – 2021-06-29, Juliana Sousa
- PREMICER – Premium Porcelain Hotelware Products, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2017-06-01 – 2020-11-30, Yury Kolen'ko
- PrintPV – Impressão em larga escala de novos sistemas fotovoltaicos baseados na calcopirite Cu(In,Ga)Se2, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2016-06-01 – 2019-11-30, Yury Kolen'ko
- SIMPLIFIED – Easy Tooth Abutment, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2017-05-01 – 2020-10-31, Yury Kolen'ko
- SmartOxidation – Membranas funcionais para oxidação de poluentes emergentes em águas residuais, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2021-01-01 – 2023-06-30, Juliana Sousa
- SpinCat – Spin-polarized Catalysts for Energy-Efficie6nt AEM Water Electrolysis, funded by Horizon 2020, FET-Open, 2021-04-01 – 2025-05-31, Yury Kolen'ko
- UT-BORN-PT – Unconventional Thermoelectrics Based on Self-Organized Binary Nanocrystal Superlatices, funded by FCT, 2018-11-01 – 2020-04-30, Yury Kolen'ko

Nanodevices

- Add2MechBio, funded by FCT, 2021-03-29 – 2024-03-28, Paulo Freitas
- CANCER – Advancing cancer research: from basic knowledge to application, funded by NORTE 2020, PO NORTE – Programa Operacional Regional do Norte, 2016-05-01 – 2019-12-31, Paulo Freitas
- CAPTURE – Mechano-dependent capture of Circulating Tumour Cells: a cell-ECM based approach coupled with cancer specific glycomarkers, funded by Portugal 2020, 2018-11-22 – 2022-02-21, Paulo Freitas
- CECs(Bio)Sensing – (Bio)sensors for assessment of contaminants of emerging concern in fishery commodities, funded by Portugal 2020, 2018-07-26 – 2022-07-25, Paulo Freitas
- CEECINST/00062/2018 - Laboratório Ibérico Internacional de Nanotecnologias (INL), funded by FCT, 2019-03-01 – 2025-08-31, Paulo Freitas
- FIM4STROKE – A Fully Integrated Magnetoresistive Biochip Platform for Stroke Patient Stratification, funded by Portugal 2020, 2018-10-04 – 2022-02-28, Elisabete Fernandes
- Fishbiosensing – Portable electrochemical (bio) sensing devices for safety and quality assessment of fishery products, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2017-06-01 – 2019-05-31, Paulo Freitas
- FoodSense – Desenvolvimento de sistema integrado em linha de enchimento para deteção de contaminantes em produtos alimentares, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2019-03-14 – 2022-03-14, Paulo Freitas
- FROnTHERA – Frontiers of technology for theranostics of cancer, metabolic and neurodegenerative diseases, funded by NORTE 2020, PO NORTE – Programa Operacional Regional do Norte, 2016-04-01 – 2020-03-20, Paulo Freitas
- HEALTHYDENT – Design of new antimicrobial osseointegrated dental implants, funded by Portugal 2020, 2018-07-26 – 2023-01-26, Paulo Freitas
- HFChip – Heart Failure-Chip: a miniaturized technology for self-monitoring of biomarkers in minimally or non-invasive body fluids, funded by La Caixa Foundation, 2020-12-24 – 2022-08-31, Inês Pinto
- i-GRAPE – Integrated, Low-Cost and Stand-Alone Micro-Optical System for Grape Maturation and Vine Hydric Stress Monitoring, funded by Horizon 2020, ICT - Information and Communication Technologies, 2018-12-01 – 2022-08-31, Paulo Freitas
- INFANTE – Satélite para aplicações marítimas e comunicações a partir de constelações, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2017-11-01 – 2021-10-30, Paulo Freitas
- InNPeC – Nano tools for rare giants: an innovative blood-based screening for prostate cancer, funded by Portugal 2020, 2018-08-10 – 2022-08-09, Paulo Freitas
- LIFESAVER – Living Impact on Fetal Evolution: Shelter-Analyze-Validate-Empower Regulations, funded by Horizon 2020, H2020-LC-GD-2020, 2021-11-01 – 2025-10-31, Paulo Freitas
- Micro&NanoFabs@PT – Network of Micro and Nano Fabrication Research Facilities in Portugal, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2017-10-01 – 2019-06-30, Paulo Freitas
- MicrofluidicGeneTherapy – Microfluidic Layer-by-layer Assembly of Cationic Liposome - Nucleic Acid Nanoparticles for Gene Delivery, funded by Portugal 2020
- MicrofluidicGeneTherapy – Microfluidic Layer-by-layer Assembly of Cationic Liposome - Nucleic Acid Nanoparticles for Gene Delivery, funded by Portugal 2020, 2018-07-06 – 2022-02-28, Bruno Silva
- NANOEATERS – Transferencia y valorización de nanotecnologías a PYMES innovadoras (early adopters) de la Eurorregión, funded by INTERREG POCTEP, 2017-07-01 – 2021-04-05, Paulo Freitas
- NanoLab – Reforço da Infraestrutura Tecnológica associada à Micro e Nanofabricação, funded by Norte 2020, Programa Operacional Regional do Norte, 2020-06-01 – 2022-05-31, Paulo Freitas
- NanoTRAINforGrowth – INL Fellowship programme in nanotechnologies for nanomedicine, energy, ICT, food and environment applications, funded by HORIZON 2020, Marie Skłodowska-Curie actions, 2016-06-01 – 2021-05-31, Paulo Freitas
- NBFS – Nanotechnology based functional solutions, funded by NORTE Programa Operacional Regional do Norte, 2016-04-01 – 2019-08-31, Paulo Freitas
- OCIDIAGNOSE – Occult Hepatitis C in Different Clinical Settings: Detection, Characterization and

Diagnostic Tools, funded by Portugal 2020, 2018-10-01 – 2022-09-30, Paulo Freitas

- OPTIMA – Optical monitoring of environmental emissions of ammonia by an integrated and autonomous membrane-based, funded by Portugal 2020, 2018-10-15 – 2022-10-14, Hugo Oliveira
- Phages-on-chip – An integrated phage-based microdevice for multiplex detection of bloodstream infections, funded by Portugal 2020, 2018-08-10 – 2022-08-09, Carla Carvalho
- Produtech SIF – Soluções para a Indústria de Futuro, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2017-10-01 – 2019-09-30, Ricardo Ferreira
- SARSChip – On-chip testing of SARS-CoV-2, funded by FCT, 2020-07-09 – 2021-01-09, Elisabete Fernandes
- SofTE – Combining soft electronics and tissue engineering as a strategy for establishing reliable implantable biosensing, funded by Portugal 2020, 2018-07-01 – 2022-06-30, Paulo Freitas
- Strip2Sense – Test strips for biomarker screening of venous thromboembolism in oncology, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2017-10-16 – 2020-01-16, Paulo Freitas

Nanofabrication for optoelectronic applications

- ARCIGS-M – Advanced architectures for ultra-thin high-efficiency CIGS solar cells with high Manufacturability, funded by Horizon 2020, NMBP - Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing, 2016-12-01 – 2020-11-30, Pedro Salomé
- Baterias 2030 – As baterias como elemento central para a sustentabilidade urbana, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-07-01 – 2023-06-30, Pedro Salomé
- InovSolarCells – Development of innovative nanostructured dielectric materials for interface passivation in thin film solar cells, funded by Portugal 2020, 2018-07-26 2021-07-25, Pedro Salomé
- NaFiSC – Novel architectures for improved thin film solar cells, funded by FCT, 2016-11-15 – 2021-11-25, Pedro Salomé
- NovaCell – Development of novel Ultrathin solar cell architectures for low-light, low-cost and flexible opto-electronic devices, funded by Portugal 2020, 2018-07-26 – 2022-07-25, Pedro Salomé
- SafeChrome – Novos revestimentos PVD sobre polímeros, latão e alumínio para substituição de processos de galvanização de Cr (VI), funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-04-01 – 2023-03-31, Pedro Salomé
- SmartPV – Development of an integrated software tool for PV plant fault prediction using AI, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2021-01-01 – 2023-06-30, Pedro Salomé

Nanomaterials for Energy Storage and Conversion

- Baterias – Baterias 2030, funded by ANI, POCI. Programa Operacional Competitividade e Internacionalização, 2020-07-01 – 2023-06-30, Lifeng Liu
- FCT-China – Novo método de espectroscopia da massa e tecnologia para o estudo do mecanismo da reacção de decomposição da água, funded by FCT, Portugal-China Bilateral Collaborative Programme, 2017-01-01 – 2019-12-31, Lifeng Liu
- FCT-PIE-LIFENG, Exploratório, funded by FCT, 2015-04-01 – 2020-03-31, Lifeng Liu
- MePhEES – Nanostructured transition Metal Phosphides for Electrochemical Energy Storage, funded by FCT, 2018-11-01 – 2020-02-15, Lifeng Liu
- MicroPhotOGen – Microfluidic photoelectrochemical devices for blood oxygenation, funded by Portugal 2020, 2018-07-26 – 2021-10-31, Lifeng Liu
- SiTMP4SolarH2 – Produção de hidrogénio assistida pelo Sol baseada em fotocátodos de silício revestidos por novos nanocatalisadores de fosforetos de metal de transição abundantes, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2016-07-01 – 2019-01-31, Lifeng Liu
- TACIT – Tandem Solar Cells Improved Optically, funded by Portugal 2020, 2018-10-01 – 2022-07-30, Lifeng Liu

Nanomedicine

- 2020.03171.CEECIND – Development of a novel biopolymeric antibacterial delivery system for the treatment of chronic wounds using phage therapy coupled with mechanical biofilm destruction and thermal wound healing augmentation, funded by FCT, 2021-03-01 – 2027-04-14, Sanna Sillankorva
- 2IQBIONEURO – Impulso de una red de I+i en química biológica para diagnóstico y tratamiento de enfermedades neurológicas funded by INTERREG POCTEP, 2019-07-01 – 2022-04-05, Manuel Bañobre
- ACTinRING – Uncovering the mechanistic assembly and function of actin ring networks in axonal biology and pathology, funded by Portugal 2020, 2018-07-01 – 2022-06-30, Inês Pinto
- CaTCh – Pre-clinical evaluation of novel chemical compounds for cancer treatment: tackling unmet clinical needs, funded by Portugal 2020, 2018-07-26 – 2022-07-25, Diana Pinho
- MagTargetON – Local specific treatment of triple-negative-breast-cancer through externally triggered target-less drug carriers, funded by Portugal 2020, 2018-07-02 – 2021-12-31, Manuel Bañobre
- MusclEng – Development of advanced strategies and solutions for muscle tissue engineering based on electromechanical microenvironments, funded by Portugal 2020, 2018-07-01 – 2022-06-30, Manuel Bañobre
- NANOTHER – TAMs-targeted and externally controlled nanotheranostics of triple-negative-breast-cancer, funded by FCT, 2018-11-01 – 2020-12-31, Manuel Bañobre
- NFsCoolingSystem – An advanced microCooling System based on inovative NanoFluids and acoustic streaming, funded by Portugal 2020, 2018-08-16 – 2022-08-15, Manuel Bañobre
- PANA – Promoting active ageing: functional nanostructures for Alzheimer's disease at ultra-early stages, funded by Horizon 2020, NMBP - Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing, 2016-03-01 – 2021-08-31, Manuel Bañobre
- PT-DZ – Magnetic nanocomposite hydrogels from biopolymers as smart delivery systems, funded by FCT, 2017-01-01 – 2019-12-31, Manuel Bañobre
- RTChip4Theranostics – Real time Liver-on-a-chip platform with integrated micro(bio)sensors for preclinical validation of graphene-based magnetic nanocarriers towards cancer theranostics, funded by Portugal 2020, 2018-07-01 – 2022-04-30, Manuel Bañobre
- SELF-i – Self-reporting immunostimulating formulation for on-demand cancer therapy with realtime treatment response monitoring, funded by Portugal 2020, 2018-07-02 – 2021-12-31, Juan Gallo

Nanostructured Materials

- CASOLEM – Correlated Analysis of Inorganic Solar Cells in and outside an Electron Microscope, funded by Portugal 2020, 2018-07-26 – 2022-07-25, Leonard Francis
- FLASH sintering of lead free functional oxides towards sustainable processing of materials for energy and related applications, funded by Portugal 2020, 2018-08-15 – 2022-02-14, Leonard Francis

Natural and Artificial Photonic Structures and Devices

- BIOMPHO2 – Towards biomimetic photosynthetic photonics, funded by Portugal 2020, 2018-05-10 – 2021-11-09, Martín López

Quantum and Linear-Optical Computation

- PHOQUSING – Photonics Quantum Sampling Machine, funded by Horizon 2020, FET-Future Emerging Technologies, 2020-09-01 – 2024-08-31, Ernesto Galvão
- QU-BOSS – QUantum advantage via non-linear BOSon Sampling, funded by ERC-European Research Council, 2020-08-01 – 2025-07-31, Ernesto Galvão

Spintronics

- EngineerIT – Criação de uma Unidade de Engenharia de Aplicação para reforço das atividades de valorização e transferência de conhecimento do INL para as empresas, funded by Norte 2020, Programa Operacional Regional do Norte, 2020-10-01 – 2023-11-30, Ricardo Ferreira
- NeWeSt – New generation of cyberphysical weighing systems, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-12-30 – 2023-06-29, Ricardo Ferreira
- NOVAMAG – Novel magnetic textures in heavy metal/ferromagnet multilayers, funded by Portugal 2020, 2018-07-26 – 2022-02-28, Alex Jenkins
- PRODUTECH 4 S&C, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-07-01 – 2023-06-30, Ricardo Ferreira
- RadioSpin – Deep oscillatory neural networks computing and learning through the dynamics of RF neurons interconnected, funded by Horizon 2020, FET – Future Emerging Technologies, 2021-10-01 – 2025-02-28, Ricardo Ferreira
- SpinAge – Spin-Hall-Nano-Oscillator based Neuromorphic Computing System Assisted by laser for Cognitive Computing, funded by Horizon 2020, FET – Future Emerging Technologies, 2020-10-01 – 2024-09-30, Ricardo Ferreira
- SPINAR – Spin-based hardware artificial neural network for embedded radio-frequency signal processing, funded by Horizon 2020, PADR - Preparatory Action on Defence Research, 2020-12-01 – 2022-12-31, Ricardo Ferreira

Theory of Quantum Nanostructures

- 2DMS – Two dimensional magnetic semiconductors, funded by FCT, 2018-09-01 – 2020-08-31, Joaquín Rossier
- Graphene-qbits – Grafeno funcionalizado para tecnologias quânticas, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2016-06-01 – 2019-08-31, Joaquín Rossier

Ultrafast bio- and Nanophotonics

- ChipAI – Energy-efficient and high-bandwidth neuromorphic nanophotonic Chips for Artificial Intelligence, funded by Horizon 2020, FET-Future Emerging Technologies, 2019-03-01 – 2022-11-30, Bruno Romeira
- Diamon4Brain – Diamond Photonics Platforms for Synaptic Connectivity Assessment in Healthy and Parkinson Disease Neuronal Models, funded by La Caixa Foundation - Health Research Programme, 2020-12-01 – 2023-11-30, Jana Nieder
- DIAMOND-CONNECT – Development of a Diamond Photonic Platform to assess connectivity in neuronal cell models, funded by FCT, 2021-03-01 – 2024-02-28, Jana Nieder
- ExtreMed – Extreme Ultrashort Pulses for Advanced Medical Applications and Diagnostics, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-04-01 – 2023-04-01, Jana Nieder
- MicroTreat – Biomimetic microenvironment for the

study and development of targeted therapies in hematological malignancies, funded by Portugal 2020, 2018-07-01 – 2022-06-30, Jana Nieder

- NANOEATERS – Transferencia y valorización de nanotecnologías a PYMES innovadoras (early adopters) de la Eurorregión, funded by INTERREG POCTEP, 2017-07-01 – 2021-04-05, Jana Nieder
- ON4SupremeSens – Graphene and novel thin films for super resolution microscopy and bio-sensing, funded by Portugal 2020, 2018-06-01 – 2022-05-31, Jana Nieder
- QUA-ND-O – Intracellular Quantum Sensing Techniques for Personalized Medicines of Neurodegenerative Diseases, funded by Portugal 2020, 2018-07-01 – 2022-06-30, Jana Nieder

Water Quality

- 2020.04021.CEECIND – Universal Platform for on-field Surface-enhanced Raman Scattering Monitoring of Biotoxins and Emerging Organic Pollutants in Marine Environment (UP4SERSMarine), funded by FCT, 2021-04-14 – 2027-04-14, Laura Rodriguez-Lorenzo
- ACUINANO – Impacto de nanopartículas metálicas en ecosistemas acuáticos y en productos de acuicultura: Desarrollo de métodos para su detección, funded by INTERREG POCTEP, 2019-06-01 – 2022-06-30, Begoña Espiña
- AIHABs – AI-powered Forecast for Harmful Algal Blooms, funded by Joint Programming Initiatives (JPIs) on Water, Oceans and Antimicrobial Resistance (AMR), 2021-09-01 – 2024-08-24, Begoña Espiña
- DIGIRAS – Optimizing land-based fish production in next generation digital recirculating aquaculture systems, funded by ERA-NET, 2020-09-01 – 2023-08-31, Begoña Espiña
- FRONTSH1P – A FRONTrunner approach to Systemic circular, Holistic & Inclusive solutions for a new Paradigm of territorial circular economy, funded by Horizon 2020, H2020-LC-GD-2020, 2021-11-01 – 2025-10-31, Laura Rodriguez-Lorenzo
- LABPLAS – Land-Based Solutions for Plastics in the Sea, funded by Horizon 2020, SC5 - Climate action, environment, resource efficiency and raw materials, 2021-06-01 – 2025-05-30
- NANOCULTURE – Risk assessment and mitigation of the presence of engineered NANOmaterials in Atlantic aquaculture, funded by INTERREG Atlantic, 2019-05-01 – 2022-11-01, Begoña Espiña
- NanoDesk – Herramientas web avanzadas para la promoción de la aplicación de la nanotecnología y el uso seguro de nanomateriales en el sector del plástico, funded by INTERREG SUDOE, 2016-06-01 – 2019-05-31, Begoña Espiña
- NANOEATERS – Transferencia y valorización de nanotecnologías a PYMES innovadoras (early adopters) de la Eurorregión, funded by INTERREG POCTEP, 2017-07-01 – 2021-04-05, Begoña Espiña
- NGQC IoRT - Next-Gen Quality Control IoRT System, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2021-03-01 – 2023-05-31, Raquel Queirós
- OPTIRAS – Optimization of the control of water quality in Recirculating Aquaculture Systems, funded by EEA - European Economic Area, Blue Growth, 2021-11-09 – 2024-04-30, Begoña Espiña
- SbD4Nano – Computing infrastructure for the definition, performance testing and implementation of safe-by-design approaches in nanotechnology supply chains, funded by Horizon 2020, NMBP - Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing, 2020-04-01 – 2024-03-31, Begoña Espiña
- SbDtoolBox - Nanotechnology-based tools and tests for Safer-by-Design nanomaterials, funded by Norte 2020, Programa Operacional Regional do Norte, 2020-10-01 – 2023-09-30, Begoña Espiña
- SEALAB – Improvement of the analysis of priority substances in inland waters through development and integration of nanosensors, robotics and information, funded by Xunta de Galicia (GAIN), 2018-09-01 – 2020-12-31, Raquel Queirós

2D Materials and devices

- 2D_PHOT – Two Dimensional Materials for Photonic Devices, funded by Horizon 2020, Marie Skłodowska-Curie actions, 2020-03-16 – 2021-12-31, Pedro Alpuim
- GEMIS – Graphene-enhanced Electro-Magnetic interference Shielding, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-06-01 – 2023-06-01, Andrea Capasso
- GNESIS – Graphenest's New Engineered System and its Implementation Solutions, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2018-08-01 – 2020-07-27, Pedro Alpuim
- GRAPHSENS – Mid- and far-infrared plasmonic biosensing with graphene, funded by Portugal 2020, 2018-07-01 – 2022-06-30, Pedro Alpuim
- MULTIMAL – A point-of-care device for non-invasive multiplexed diagnosis of malaria, funded by Horizon 2020, European research infrastructures (including e-Infrastructures), 2020-05-20 – 2020-10-31, Jérôme Borme
- NeuralGRAB – Graphene aptasensor bioelectronics, funded by La Caixa Foundation - Health Research Programme, 2021-11-16 – 2024-11-16, Pedro Alpuim
- TARGET – TeraHertz Sources using Graphene Field-effect transistor, funded by FCT, UTAustin Portugal Program, 2020-08-18 – 2021-11-15, Alexandre Chicharo

Systems Engineering

- BIOSENSOR4FETUS – Development of a biosensor for fetal well-being monitoring, 2018-07-02 – 2022-10-01, João Piteira
- Moore4Medical – Accelerating Innovation in Microfabricated Medical Devices, funded by Horizon 2020, ECSEL - Electronic Components and Systems for European Leadership, 2020-06-01 – 2023-05-31, João Piteira
- NANOEATERS – Transferencia y valorización de nanotecnologías a PYMES innovadoras (early adopters) de la Eurorregión, funded by INTERREG POCTEP, 2017-07-01 – 2021-04-05, João Piteira
- PROFITEX – Desenvolvimento de tecidos Electro eficientes e Profiláticos para a indústria automóvel, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2021-01-04 – 2023-06-30, João Piteira
- R&W Clean – New solutions for sensing environmental and biological parameters, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-12-31 – 2023-06-30, João Piteira

Technology Engineering

- Product In Touch – Development and Industrial Validation of a Multimodal Virtual Prototyping for In-Car Design, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2018-07-01 – 2021-12-30, Edoardo Sotgiu
- ThermalBuffer – The buffering effects of upwelling and geomorphology on coastal warming, funded by Portugal 2020, 2018-06-01 – 2022-05-31, Marco Martíns

Business and Strategic Relations

- AINanoTEC - Artificial Intelligence & Nanotechnology based Startups Entrepreneurial Programme, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-11-01 – 2023-05-01, Ana Vila
- ATLANTIC-KET-MED – Establishing a transnational inter-regional advanced pilot manufacturing line/ecosystem for future biomedical products, funded by INTERREG Europe, 2017-11-01 – 2022-03-01, Ana Vila
- CLUSTERNANOROAD – Driving Europe's NMBP economy - Cross-cluster innovation and value creation through validated NMBP collaborative strategies and roadmap, funded by Horizon 2020, NMBP - Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing, 2016-09-01 – 2019-02-28, Marina Dias

- CODIGOMAIS – Creación de un Ecosistema Transfronterizo de Innovación en Salud, funded by INTERREG POCTEP, 2017-07-01 – 2020-12-31, Ana Vila
- CTB – Cluster Transfronteirizo Biotecnologico, funded by INTERREG POCTEP, 2018-08-01 – 2020-12-31, Ana Vila
- EPPN – European Network for Pilot Projects and Innovation Hubs, funded by Horizon 2020, NMBP - Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing, 2017-06-01 – 2020-05-31, Marina Dias
- FuEL – Future Entrepreneurs' League, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2017-10-01 – 2019-12-31, Francisco Guimarães
- HIBA- HUB IBERIA AGROTECH: Multi-regional ecosystem for Agrifood digitization through Digital Innovation Hubs (DIH), funded by INTERREG POCTEP, 2018-07-01 – 2022-12-31, Sonia Pazos
- INL@H2020 - Internacionalização de I&D, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2019-05-18 – 2022-05-01, Marina Dias
- INNO4COV-19 – Boosting Innovation for COVID-19 Diagnostic, Prevention and Surveillance, funded by Horizon 2020, SC1 - Health, demographic change and wellbeing, 2020-10-01 – 2022-09-30, Marina Brito
- IPValue@INL – Turning Knowledge into Value thought IP Protection at INL, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2018-06-01 – 2020-05-31, Ulf Håkanson
- KET4CleanProduction – Pan-European Access for man. SME on tech. services for clean production through a Network of premier KET Technology Centres with one stop shop, funded by Horizon 2020, INNOSUP - Innovation in SMEs, 2018-01-01 – 2021-09-30, Marina Dias
- KETmaritime – Transfer of Key Enabling Technologies (KETs) to the Maritime Industries, funded by INTERREG Atlantic, 2017-11-01 – 2021-06-30, Ana Vila
- NANOEATERS – Transferencia y valorización de nanotecnologías a PYMES innovadoras (early adopters) de la Eurorregión, funded by INTERREG POCTEP, 2017-07-01 – 2021-04-05, Monike Rocha
- nanoGateway – Plataforma Transfronteiriça para a promoção da I&DT+i em nanotecnologia, funded by INTERREG POCTEP, 2017-01-01 – 2020-12-31, Monike Rocha
- NMP-REG – Delivering NMP to REGional manufacturing, funded by INTERREG Europe, 2016-04-01 – 2022-09-30, Ana Vila
- NOuRIsH – NanOtechnology Rapid Prototyping Innovation Hub, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2017-09-01 – 2019-12-31, Mariana Fernandes
- PITCCH – Pan-European Open Innovation Network for Corporate Challenges in advanced technologies, funded by Horizon 2020, INNOSUP - Innovation in SMEs, 2020-05-01 – 2023-04-30, Michela Mattaloni
- SAFE-N-MEDTECH – Safety testing in the life cycle of nanotechnology-enabled medical, funded by Horizon 2020, NMBP - Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing, 2019-04-01 – 2023-03-30, Marina Brito
- SiNfONiA - Safety in NanOmaterials & Nanotechnology, funded by Horizon 2020, WIDESPREAD - Spreading Excellence and Widening Participation, 2019-06-01 – 2024-12-31, Marina Brito
- SUSNANOFAB – Integrated EU strategy, services and international coordination activities for the promotion of competitive and sustainable nanofabrication industry, funded by Horizon 2020, NMBP - Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing, 2020-03-01 – 2023-02-28, Monike Rocha

Research, Technology and Innovation Office

- ASCENTplus – Access to European Infrastructure for Nanoelectronics, funded by Horizon 2020, European research infrastructures (including e-Infrastructures), 2020-09-01 – 2024-08-30, Dmitri Petrovykh
- COUNTED – Coronavirus Transmission: Count and Detect, funded by Portugal 2020, POCI – Programa Operacional Competitividade e Internacionalização, 2020-06-01 – 2021-07-31, Dmitri Petrovykh
- EuroNanoForum 2021 – Green and Resilient Europe: What role for nano-enabled industries?, funded by Horizon 2020, NMBP - Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing, 2020-11-01 – 2021-06-30, Jorge Fiens
- Nano-MINENV – Minerals of environmental relevance in acid mine drainage contaminated systems: properties and reactivity at the nanoscale, funded by Portugal 2020, 2018-06-01 – 2022-02-28, Dmitri Petrovykh
- NEP – Nano Foundry and Fine Analysis – Europe | PILOT, funded by Horizon 2020, European research infrastructures (including e-Infrastructures), 2021-03-01 – 2026-02-28, Dmitri Petrovykh
- ScienceWars - May Science be with you!, funded by Horizon 2020, Marie Skłodowska-Curie actions, 2018-06-01 – 2020-01-31, Inês Costa
- SCILI – Science for Climate, funded by Horizon 2020, Marie Skłodowska-Curie actions, 2021-05-01 – 2021-12-31, Gina Palha

INL Publications 2019-2021

2019

Atomic Manipulation for Quantum Nanotechnology

- 2D/2D Electrical Contacts in the Monolayer WSe2 Transistors: A First-Principles Study, ACS Applied Nano Materials, https://doi.org/10.1021/acsanm.9b00290
- A highly efficient TiOX (X = N and P) photocatalyst for inactivation of Microcystis aeruginosa under visible light irradiation, Separation and Putification Technology, http://doi.org/10.1016/j.seppur.2019.04.034
- A ternary SnS1.26Se0.76 alloy for flexible broadband photodetectors, RSC Advances, http://doi.org/10.1039/c9ra01734h
- Air-Induced Degradation and Electrochemical Regeneration for the Performance of Layered Ni-Rich Cathodes, ACS Applied Materials & Interfaces, http://doi.org/10.1021/acsami.9b11452
- Atomic-scale dynamic observation reveals temperature-dependent multistep nucleation pathways in crystallization, Nanoscale Horizons, http://doi.org/10.1016/j.flatc.2018.09.001
- Competing Interface and Bulk Effect-Driven Magnetoelectric Coupling in Vertically Aligned Nanocomposites, Advances Science, http://doi.org/10.1002/advs.201901000
- Disassembly of 2D Vertical Heterostructures, Advanced Materials, http://doi.org/10.1002/adma.201805976
- Effect of Twinning Behavior on Dynamic Recrystallization During Extrusion of AZ31Mg Alloy, JOM, http://doi.org/10.1007/s11837-019-03336-8
- Effects of Carbon and Boron on Structure and Properties of Austenitic Stainless Steel Coatings Fabricated by Laser Remanufacturing, Steel Research International, http://doi.org/10.1002/srin.201800473
- Fe-Doped ZnO/Reduced Graphene Oxide Nanocomposite with Synergic Enhanced Gas Sensing Performance for the Effective Detection of Formaldehyde, ACS Omega, https://doi.org/10.1021/acsomega.9b00734
- Few-Layer Bismuthene with Anisotropic Expansion for High-Areal-Capacity Sodium-Ion Batteries, Advanced Materials, https://doi.org/10.1002/adma.201807874
- Highly Sensitive Polarization Photodetection Using a Pseudo-One Dimensional Nb((1-x))TixS3 Alloy, ACS Applied Materials & Interfaces, http://doi.org/10.1021/acsami.8b19050
- High-Yield Electrochemical Production of Large-Sized and Thinly Layered NiPS3 Flakes for Overall Water Splitting, Small, http://doi.org/10.1002/smll.201902427
- Hybrid Organic-Inorganic Gel Electrocatalyst for Stable Acidic Water Oxidation, ACS Nano, http://doi.org/10.1021/acsnano.9b07826
- In Situ Atomic-Scale Observation of Kinetic Pathways of Sublimation in Silver Nanoparticles, Advanced Science, http://doi.org/10.1002/advs.201802131
- In-situ active formation of carbides coated with NP-TiO2 nanoparticles for efficient adsorption-photocatalytic inactivation of harmful algae in eutrophic water, Chemosphere, http://doi.org/10.1016/j.chemosphere.2019.04.120
- Magnetism and Optical Anisotropy in van der Waals Antiferromagnetic Insulator CrOCl, ACS Nano, http://doi.org/10.1021/acsnano.9b04726
- Metallic interface induced by electronic reconstruction in crystalline-amorphous bilayer oxide films, Science Bulletin, http://doi.org/10.1016/j.scib.2019.08.026
- Microstructure and Mechanical Properties of AZ31 Mg Alloy Fabricated by Pre-compression and Frustum Shearing Extrusion, Acta Metallurgica Sinica (English Letters), http://doi.org/10.1007/s40195-018-0843-0
- Nanoscale magnetization inhomogeneity within single phase nanopillars, Physical Review Materials, http://doi.org/10.1103/PhysRevMaterials.3.081401
- Omics Meeting Onics: Towards the Next Generation of Spectroscopic-Based Technologies in Personalized Medicine, Journal of Personalized Medicine, http://doi.org/10.3390/jpm9030039
- Phase Identification and Strong Second Harmonic Generation in Pure epsilon-InSe and Its Alloys, Nano Letters, http:// doi.org/10.1021/acs.nanolett.9b00487
- Research on Biodegradable Mg-Zn-Gd Alloys for Potential Orthopedic Implants: In Vitro and in Vivo Evaluations, ACS Biomaterials Science & Engineering, http://doi.org/10.1021/acsbiomaterials.8b01563
- Strengthening and toughening by partial slip in nanotwinned diamond, Carbon, http://doi.org/10.1016/j.carbon.2019.04.107
- Synthesis of low-symmetry 2D Ge(1-x)SnxSe2 alloy flakes with anisotropic optical response and birefringence, Nanoscale, http://doi.org/10.1039/c9nr07820g
- Vanadium Doping Enhanced Electrochemical Performance of Molybdenum Oxide in Lithium-Ion Batteries, Advanced Functional Materials, http://doi.org/10.1002/adfm.201805227

Atomic structure-composition of materials

- An experimental and theoretical study on the crystal structure and elastic properties of Ta1-xOx coatings, Surface & Coatings Technology, http://doi.org/10.3390/jsan10010022
- Automated Segmentation of Nanoparticles in BF TEM Images by U-Net Binarization and Branch and Bound, Computer Analysis of Images and Patterns, http://doi.org/10.1007/978-3-030-29888-3_10
- Electrochemical Degradation of Pt-Ni Nanocatalysts: An Identical Location Aberration-Corrected Scanning Transmission Electron Microscopy Study, Nano Letters, http://doi.org/10.1021/acs.nanolett.8b03022
- Exploring the synthesis conditions to control the morphology of gold-iron oxide heterostructures, Nano Research, http://doi.org/10.1007/s12274-019-2431-7
- Hybrid Organic-Inorganic Gel Electrocatalyst for Stable Acidic Water Oxidation, ACS Nano, http://doi.org/10.1021/acsnano.9b07826
- Influence of silicon on the microstructure and the chemical properties of nanostructured ZrN-Si coatings deposited by means of pulsed-DC reactive magnetron sputtering, Applied Surface Science, http://doi.org/10.1016/j.apsusc.2019.03.128
- On the Precipitation of Sigma and Chi Phases in a Cast Super Duplex Stainless Steel, Metallurgical and Materials Transactions A, http://doi.org/10.1007/s11661-019-05396-6
- Structuring of di-alkyl-urethanesils, Journal of Sol-Gel Science and Technology, http://doi.org/10.1007/s10971-018-4703-1
- Ultrafast Intercalation Enabled by Strong Solvent-Host Interactions: Understanding Solvent Effect at the Atomic Level, Angewandte Chemie International Edition, http://doi.org/10.1002/anie.201908982
- Understanding the Stability of Nanoscale Catalysts in PEM Fuel Cells by Identical Location TEM, Nanocarbons for Energy Conversion: Supramolecular Approaches, http://doi.org/10.1007/978-3-319-92917-0_5
- Understanding the Structure of LiMn2O4 by Differential Phase Contrast, Microscopy and Microanalysis, http://doi.org/10.1007/978-3-319-92917-0_5

Food Processing and Nutrition

- Advances in Processing Technologies for Bio-based Nanosystems, Food, http://doi.org/10.1201/978131517732
- Bacteriophage phi IBB-PF7A loaded on sodium alginate-based films to prevent microbial meat spoilage, International Journal of Food Microbiology, http://doi.org/10.1016/j.ijfoodmicro.2018.11.026
- Candelilla Wax-Based Coatings and Films: Functional and Physicochemical Characterization, Food and Bioprocess Technology, http://doi.org/10.1007/s11947-019-02339-2
- Engineered Nanostructures for Enrichment and Fortification of Foods, Food Applications of Nanotechnology, http://doi.org/10.1201/9780429297038
- Escherichia coli and Salmonella Enteritidis dual-species biofilms: interspecies interactions and antibiofilm efficacy of phages, Scientific Reports, http://doi.org/10.1038/s41598-019-54847-y
- Evaluating the effect of chitosan layer on bioaccessibility and cellular uptake of curcumin nanoemulsions, Journal of Food Engineering, http://doi.org/10.1016/j.jfoodeng.2018.09.007
- Food Grade Polymers for the Gelation of Edible Oils Envisioning Food Applications, Polymers for Food Applications. http://doi.org/10.1007/978-3-319-94625-2_22
- Hydrogel as an alternative structure for food packaging systems, Carbohydrate Polymers, http://doi.org/10.1016/j.carbpol.2018.10.006
- In Vitro Intestinal Uptake And Permeability Of Fluorescently-Labelled Hyaluronic Acid Nanogels , International Journal of Nanomedicine, http://doi.org/10.2147/IJN.S224255
- Liposomes loaded with phenolic extracts of Spirulina LEB-18: Physicochemical characterization and behavior under simulated gastrointestinal conditions, Food Research International, http://doi.org/10.1016/j.foodres.2018.11.023
- Nanotechnology as a Way for Bio-based and Biodegradable Food Packaging with Enhanced Properties, Advances in Processing Technologies for Bio-based Nanosystems in Food, http://doi.org/10.1201/9781315177328-11
- Phenolic Compound-Loaded Nanosystems: Artificial Neural Network Modeling to Predict Particle Size, Polydispersity Index, and Encapsulation Efficiency, Food and Bioprocess Technology, http://doi.org/10.1007/s11947-019-02298-8

- Specific detection of viable Salmonella Enteritidis by phage amplification combined with qPCR (PAA-qPCR) in spiked chicken meat samples, Food Control, http://doi.org/10.1016/j.foodcont.2018.12.038
- Tamarind Trypsin Inhibitor in Chitosan–Whey Protein Nanoparticles Reduces Fasting Blood Glucose Levels without Compromising Insulinemia: A Preclinical Study, Nutrients, http://doi.org/10.3390/nu11112770
- Wettability of edible coatings on Nile tilapia fillets (Oreochromis niloticus), Journal of Food Engineering, http://doi.org/10.1016/j.jfoodeng.2018.11.026

Food Quality and Safety

- Amplification-free SERS analysis of DNA mutation in cancer cells with single-base sensitivity, Nanoscale, http://doi.org/10.1039/c9nr00501c
- Attomolar Label-Free Detection of DNA Hybridization with Electrolyte-Gated Graphene Field-Effect Transistors, ACS Sensors, http://doi.org/10.1021/acssensors.8b00344
- Combination of Immunomagnetic Separation and RealTime Recombinase Polymerase Amplification (IMSqRPA) for Specific Detection of Listeria monocytogenes in Smoked Salmon Samples, Journal of Food Science http://doi.org/10.1111/1750-3841.14662
- Gold Nanostars for the Detection of Foodborne Pathogens via Surface-Enhanced Raman Scattering Combined with Microfluidics, ACS Applied Nano Materials, http://doi.org/10.1021/acsanm.9b01223
- Specific detection of viable Salmonella Enteritidis by phage amplification combined with qPCR (PAA-qPCR) in spiked chicken meat samples, Food Control, http://doi.org/10.1016/j.foodcont.2018.12.038

Integrated Micro and Nanotechnologies

- A morphological and electronic study of ultrathin rear passivated Cu(In,Ga)Se-2 solar cells, Thin Solid Filmes, http://doi.org/10.1016/j.tsf.2018.12.028
- All-Digital Time-to-Digital Converter Design Methodology Based on Structured Data Paths, IEEE Access, http://doi.org/10.1109/ACCESS.2019.2933496
- Attomolar Label-Free Detection of DNA Hybridization with Electrolyte-Gated Graphene Field-Effect Transistors, ACS Sensors, http://doi.org/10.1021/acssensors.8b00344
- Designing Synchronizers for Nutt-TDCs, 5th International Conference on Event-Based Control, Communication, and Signal Processing (EBCCSP), http://doi.org/10.1109/EBCCSP.2019.8836914
- Functionalization of single-layer graphene for immunoassays, Applied Surface Science, http://doi.org/10.1016/j.apsusc.2019.03.004
- Molecular Lipid Films on Microengineering Materials, Langmuir, http://doi.org/10.1021/acs.langmuir.9b01120
- Recent Developments and Challenges in FPGA-Based Time-to-Digital Converters, IEEE Transactions on Instrumentation and Measurement, http://doi.org/10.1109/TIM.2019.2938436
- Sub-Micron Mems Accelerometer with Handle-Layer Patterning for Damping Enhancement Using Time Transduction, 20th International Conference on Solid-State Sensors, Actuators and Microsystems & Eurosensors XXXIII, http://doi.org/10.1109/TRANSDUCERS.2019.8808247
- Thin-Film Silicon Resonators on Ultra-Flexible 10 Micrometer-Thick Polyimide Substrates 20th International Conference on Solid-State Sensors, Actuators and Microsystems and Eurosensors XXXIII, http://doi.org/10.1109/TRANSDUCERS.2019.8808792

Laboratory for Nanostructured Solar Cells

- Area-selective electrodeposition of micro islands for CuInSe2-based photovoltaics, Results in Phycis, http://doi.org/10.1016/j.rinp.2019.02.047
- Direct evidence for grain boundary passivation in Cu(In,Ga)Se-2 solar cells through alkali-fluoride post-deposition treatments, Nature Communications, http://doi.org/10.1038/s41467-019-11996-y
- Evidence of reversible oxidation at CuInSe2 grain boundaries, IEEE 46th Photovoltaic Specialists Conference (PVSC), http://doi.org/10.1109/PVSC40753.2019.8981351
- Giant V-oc Boost of Low-Temperature Annealed Cu(In,Ga)Se-2 with Sputtered Zn(O,S) Buffers, Physica Satus Solidi-Rapid Resarch Letters, http://doi.org/10.1002/pssr.201900145
- High-detectivity infrared photodetector based on InAs submonolayer quantum dots grown on GaAs(001) with a 2×4 surface reconstruction, Journal of Applied Physics, http://doi.org/10.1063/1.5125238
- Interface modification in type-II ZnCdSe/Zn(Cd) Te QDs for high efficiency intermediate band solar cells, Journal of Crystal Growth, http://doi.org/10.1016/j.jcrysgro.2019.02.025
- Template-directed self-organization of colloidal PbTe nanocrystals into pillars, conformal coatings, and self-supported membranes, Nanoscale Advances, http://doi.org/10.1039/c9na00370c
- Thin-film micro-concentrator solar cells, Journal of Physics: Energy, http://doi.org/10.1088/2515-7655/ab4289
- Voids in Kesterites and the Influence of Lamellae Preparation by Focused Ion Beam for Transmission Electron Microscopy Analyses, IEEE Journal of Photovoltaics, http://doi.org/10.1109/JPHOTOV.2018.2889602

Medical Devices

- Amplification-free SERS analysis of DNA mutation in cancer cells with single-base sensitivity, Nanoscale. http://doi.org/10.1039/c9nr00501c
- Exploring sialyl-Tn expression in microfluidic-isolated circulating tumour cells: A novel biomarker and an analytical tool for precision oncology applications, New Biotechnology, http://doi.org/10.1016/j.nbt.2018.09.004
- Fast and efficient microfluidic cell filter for isolation of circulating tumor cells from unprocessed whole blood of colorectal cancer patients, Scientific Reports, http://doi.org/10.1038/s41598-019-44401-1
- Gold Nanostars for the Detection of Foodborne Pathogens via Surface-Enhanced Raman Scattering Combined with Microfluidics, ACS Applied Nano Materials, http://doi.org/10.1021/acsanm.9b01223
- Microfluidics-Driven Fabrication of a Low Cost and Ultrasensitive SERS-Based Paper Biosensor, Applied Sciences-Basel, http://doi.org/10.3390/app9071387
- Portable sensing system based on electrochemical impedance spectroscopy for the simultaneous quantification of free and total microcystin-LR in freshwaters, Biosensors & Bioelectronics, http://doi.org/10.1016/j.bios.2019.111550
- The Significance of Circulating Tumour Cells in the Clinic, Acta Cytologica, http://doi.org/10.1159/000495417

Nanochemistry

- Bi-metallic cobalt-nickel phosphide nanowires for electrocatalysis of the oxygen and hydrogen evolution reactions, Catalysis Today, http://doi.org/10.1016/j.cattod.2019.05.037
- Effectiveness and Safety of a Nontargeted Boost for a CXCR4-Targeted Magnetic Hyperthermia Treatment of Cancer Cells, ACS Omega, http://doi.org/10.1021/acsomega.8b02199
- Electrocatalytic water oxidation over AlFe2B2, Chemical Science, http://doi.org/10.1039/C8SC04106G
- Enhanced Thermoelectric Performance in Hf-Free p-Type (Ti, Zr)CoSb Half-Heusler Alloys, Journal of Electronic Materials, http://doi.org/10.1007/s11664-019-07486-y
- NiP2: A Story of Two Divergent Polymorphic Multifunctional Materials, Chemistry of Materials, http://doi.org/10.1021/acs.chemmater.9b00565
- Recyclable magnetic covalent organic framework for the extraction of marine biotoxins, Nanoscale, http://doi.org/10.1039/C9NR00388F
- Spinodal decomposition in (Ti, Zr)CoSb half-Heusler: A nanostructuring route toward high efficiency thermoelectric materials, Journal of Applied Physics, http://doi.org/10.1063/1.5109091
- Superstructural Ordering in Hexagonal CuInSe2 Nanoparticles, Chemistry of Materials, http://doi.org/10.1021/acs.chemmater.8b04368
- Tailoring Covalent Organic Frameworks To Capture Water Contaminants, Chemistry - a European Journal, http://doi.org/10.1002/chem.201806025
- Template-directed self-organization of colloidal PbTe nanocrystals into pillars, conformal coatings, and self-supported membranes, Nanoscale Advances, http://doi.org/10.1039/c9na00370c
- Zero-dimensional cesium lead halide perovskites: Phase transformations, hybrid structures, and applications, Journal of Solid State Chemistry, http://doi.org/10.1016/j.jssc.2019.01.005

Nanodevices

- Effectiveness and Safety of a Nontargeted Boost for a CXCR4-Targeted Magnetic Hyperthermia Treatment of Cancer Cells, ACS omega, http://doi.org/10.1021/acsomega.8b02199
- Electrochemical Immunosensor for TNF alpha-Mediated Inflammatory Disease Screening, ACS Chemical Neuroscience, http://doi.org/10.1021/acschemneuro.9b00036
- Exploring sialyl-Tn expression in microfluidic-isolated circulating tumour cells: A novel biomarker and an analytical tool for precision oncology applications, New Biotechnology, http://doi.org/10.1016/j.nbt.2018.09.004
- Flexible and expeditious assay for quantitative monitoring of alpha-amylase and amyloglucosidase activities, MethodsX, http://doi.org/10.1016/j.mex.2019.01.007
- Functionalization of single-layer graphene for immunoassays, Applied Surface Science, http://doi.org/10.1016/j.apsusc.2019.03.004
- Nanoscale true random bit generator based on magnetic state transitions in magnetic tunnel junctions, Scientific Reports, http://doi.org/10.1038/s41598-019-52236-z
- Portable sensing system based on electrochemical impedance spectroscopy for the simultaneous quantification of free and total microcystin-LR in freshwaters, Bionsensors & Bioelectronics, http://doi.org/10.1016/j.bios.2019.111550

- Specific detection of viable Salmonella Enteritidis by phage amplification combined with qPCR (PAA-qPCR) in spiked chicken meat samples, Food Control, http://doi.org/10.1016/j.foodcont.2018.12.038
- Spin torque nano-oscillator driven by combined spin injection from tunneling and spin Hall current, Communications Physics, http://doi.org/10.1038/s42005-019-0119-7
- Tuning magnetic monopole population and mobility in unidirectional array of nanomagnets as a function of lattice parameters, Applied Physics Letters, http://doi.org/10.1063/1.5088219
- Unravelling the phytonutrients and antioxidant properties of European Vicia faba L. seeds, Food Research International, http://doi.org/10.1016/j.foodres.2018.09.025

Nanofabrication for optoelectronic applications

- A morphological and electronic study of ultrathin rear passivated Cu(In,Ga)Se-2 solar cells, Thin Sold Films, http://doi.org/10.1016/j.tsf.2018.12.028
- Area-selective electrodeposition of micro islands for CuInSe2-based photovoltaics, Results in Physics, http://doi.org/10.1016/j.rinp.2019.02.047
- CuInSe2 quantum dots grown by molecular beam epitaxy on amorphous SiO2 surfaces, Beilstein Journal of Nanotechnology, http://doi.org/10.3762/bjnano.10.110
- Evidence of Limiting Effects of Fluctuating Potentials on V-OC of Cu(In, Ga)Se-2 Thin-Film Solar Cells, Physical Review Applied, http://doi.org/10.1103/PhysRevApplied.11.054013
- Light management design in ultra-thin chalcopyrite photovoltaic devices by employing optical modelling, Solar Energy Materials and Solar Cells, http://doi.org/10.1016/j.solmat.2019.109933
- Modelling Supported Design of Light Management Structures in Ultra-Thin Cigs Photovoltaic Devices, Informacije MIDEM - Journal of Microelectronics, Electronic Components and Materials, http://doi.org/10.33180/InfMIDEM2019.307
- Phase selective growth of Cu12Sb4S13 and Cu3SbS4 thin films by chalcogenization of simultaneous sputtered metal precursors, Journal of Alloys and Compounds, http://doi.org/10.1016/j.jallcom.2019.05.149
- Rear Optical Reflection and Passivation Using a Nanopatterned Metal/Dielectric Structure in Thin-Film Solar Cells, IEEE Journal of Photovoltaics, http://doi.org/10.1109/JPHOTOV.2019.2922323
- Understanding the AC Equivalent Circuit Response of Ultrathin Cu(In,Ga)Se-2 Solar Cells, IEEE Journal of Photovoltaics, http://doi.org/10.1109/JPHOTOV.2019.2927918
- Voids in Kesterites and the Influence of Lamellae Preparation by Focused Ion Beam for Transmission Electron Microscopy Analyses, IEEE Journal of Photovoltaics, http://doi.org/10.1109/JPHOTOV.2018.2889602

Nanomaterials for Energy Storage and Conversion

- Artificial electrode interfaces enable stable operation of freestanding anodes for high-performance flexible lithium ion batteries" Journal of Materials Chemistry A, http://doi.org/10.1039/C9TA03302E
- General Synthetic Strategy for Pomegranate-like
- Transition-Metal Phosphides@N-Doped Carbon Nanostructures with High Lithium Storage Capacity, ACS Materials Letters, http://doi.org/10.1021/acsmaterialslett.9b00216
- High performance flexible solid-state asymmetric supercapacitors based on bi-metallic transition metal phosphide nanocrystals ACS Nano, http://doi.org/10.1021/acsnano.5b06648
- Invert pyramid textured p-silicon covered with Co2P as an efficient and stable solar hydrogen evolution photocathode, ACS Energy Letters, http://doi.org/10.1021/acsenergylett.9b00964
- Large-Scale Fabrication of Hollow Pt3Al Nanoboxes and Their Electrocatalytic Performance for Hydrogen Evolution Reaction, ACS Sustainable Chemistry & Engineering, http://doi.org/10.1021/acssuschemeng.9b00372
- PVP assisted hydrothermal synthesis of CuCoO2 nanoplates with enhanced oxygen evolution performance" ACS Sustainable Chemistry & Engineering http://doi.org/10.1021/acssuschemeng.8b05236
- The oxygen evolution reaction enabled by transition metal phosphide and chalcogenide pre-catalysts with dynamic changes, Chemical Communications, http://doi.org/10.1039/C9CC02845E

Nanomedicine

- Alternatives and Combinational Therapies for Bacterial Infections, Frontiers in Microbiology, http://doi.org/10.3389/fmicb.2018.03359
- Effectiveness and Safety of a Nontargeted Boost for a CXCR4-Targeted Magnetic Hyperthermia Treatment of Cancer Cells. ACS Omega, http://doi.org/10.1021/acsomega.8b02199
- Enhanced performance of cobalt ferrite encapsulated in graphitic shell by means of AC magnetically activated catalytic wet peroxide oxidation of 4-nitrophenol, Chemical Engineering Journal, http://doi.org/10.1016/j.cej.2018.09.173
- Escherichia coli and Salmonella Enteritidis dual-species biofilms: interspecies interactions and antibiofilm efficacy of phages, Scientific Reports, http://doi.org/10.1038/s41598-019-54847-y
- Frontiers in Microbiology eBook, http://doi.org/10.3389/978-2-88945-789-2
- Magnetic Dehydrodipeptide-Based Self-Assembled Hydrogels for Theragnostic Applications, Nanomaterials, http://doi.org/10.3390/nano9040541
- Recent Progress on Manganese-Based Nanostructures as Responsive MRI Contrast Agents, Chemistry – A European Journal, http://doi.org/10.1002/chem.201802851
- Synthesis, characterization and in vitro validation of a magnetic zeolite nanocomposite with T-2-MRI properties towards theranostic applications, Journal of Materials Chemistry, http://doi.org/10.1039/c9tb00078j
- Targeting tumor cells and neovascularization using RGD-functionalized magnetoliposomes, International Journal of Nanomedicine, http://doi.org/10.2147/IJN.S214041

Nanostructured Materials

- Atomic-scale dynamic observation reveals temperature-dependent multistep nucleation pathways in crystallization, Nanoscale Horizons, http://doi.org/10.1016/j.flatc.2018.09.001
- In Situ Atomic-Scale Observation of Kinetic Pathways of Sublimation in Silver Nanoparticles, Advanced Science, http://doi.org/10.1002/advs.201802131
- Large-Scale Fabrication of Hollow Pt3Al Nanoboxes and Their Electrocatalytic Performance for Hydrogen Evolution Reaction, ACS Sustainable Chemistry & Engineering, http://doi.org/10.1021/acssuschemeng.9b00372
- Nanotube array-based barium titanate-cobalt ferrite composite film for affordable magnetoelectric multiferroics, Journal of Materials Chemistry, http://doi.org/10.1039/c9tc02442e
- Surface Science and Colloidal Stability of Double-Perovskite Cs2AgBiBr6 Nanocrystals and Their Superlattices, Chemistry of Materials, http://doi.org/10.1021/acs.chemmater.9b02149
- Synthesis and characterization of quaternary La(Sr) S-TaS2 misfit-layered nanotubes, Beilstein Journal of Nanotechnology, http://doi.org/10.3762/bjnano.10.111
- Thermal Stability of the Black Perovskite Phase in Cesium Lead Iodide Nanocrystals Under Humid Conditions, Chemsitry of Materials, http://doi.org/10.1021/acs.chemmater.9b03533

Precision Medicine Engineering

- Emerging Technologies for the Next Generation Personalized and Precision Medicine, Journal of Personalized Medicine, http://doi.org/10.3390/jpm9030039
- Omics Meeting Onics: Towards the Next Generation of Spectroscopic-Based Technologies in Personalized Medicine, Journal of Personalized Medicine, http://doi.org/10.3390/jpm9030039
- Perspective: Cellular and Molecular Profiling Technologies in Personalized Oncology, Journal of Personalized Medicine, http://doi.org/10.3390/jpm9030044

Quantum Software Engineering

- A Quantum Algorithm for Ray Casting using an Orthographic Camera, IEEE Xplore, http://doi.org/10.1109/ICGI47575.2019.8955061
- Generalising KAT to verify weighted computations, Scientific Annals of Computer Science, http://doi.org10.7561/SACS.2019.2.141

Spintronics

- Magnetodynamics in orthogonal nanocontact spin-torque nano-oscillators based on magnetic tunnel junctions, Applied Physics Letters, http://doi.org/10.1063/1.5121356
- Nanoscale true random bit generator based on magnetic state transitions in magnetic tunnel junctions, Scientific Reports, http://doi.org/10.1038/s41598-019-52236-z
- Portable sensing system based on electrochemical impedance spectroscopy for the simultaneous quantification of free and total microcystin-LR in freshwaters, Biosensors & Bioelectronics, http://doi.org/10.1016/j.bios.2019.111550
- Spin torque nano-oscillator driven by combined spin injection from tunneling and spin Hall current, Communications Physics, http://doi.org/10.1038/s42005-019-0119-7

Theory of Quantum Nanostructures

- Designer fermion models in functionalized, Physical Review Research, http://doi.org/10.1103/PhysRevResearch.1.033173
- Enhanced lifetimes of spin chains coupled to chiral edge states, New Journal of Physics, http://doi.org/10.1088/1367-2630/ab116b
- Exchange rules for diradical Pi-conjugated hydrocarbons, Nano Letters, http://doi.org/10.1021/acs.nanolett.9b01773
- From Cyclic Nanorings to Single-Walled Carbon Nanotubes: Disclosing the Evolution of their Electronic Structure with the Help of Theoretical Methods, Physical Chemistry Chemical Physics, http://doi.org/10.1039/C8CP06615A
- Imaging magnetic 2D crystals with quantum sensors, Science, http://doi.org/10.1126/science.aax6598
- Hybrid plasmon-magnon polaritons in graphene-antiferromagnet heterostructures, 2D Materials, http://doi.org/10.1088/2053-1583/ab2513
- Interplay between interlayer exchange and stacking in CrI3, Solid State Communications, http://doi.org/10.1016/j.ssc.2019.113662
- Optical orientation with linearly polarized light in transition metal dichalcogenides, Physical Review B, http://doi.org/10.1103/PhysRevB.99.125405
- Single spin resonance driven by electric modulation of the g-factor anisotropy, Physical Review Research, http://doi.org/10.1103/PhysRevResearch.1.033185
- Tuning the exchange bias on a single atom from 1 mT to 10 T, Physical Review Letters, http://doi.org/10.1103/PhysRevLett.122.227203

Ultrafast bio- and Nanophotonics

- Differences in the optical properties of valve and girdle band in a centric diatom, Interface Focus, http://doi.org/10.1098/rsfs.2018.0031
- GFP fluorescence peak fraction analysis based nanothermometer for the assessment of exothermal mitochondria activity in live cells, Scientific Reports, http://doi.org/10.1038/s41598-019-44023-7
- Graphene setting the stage: tracking DNA hybridization with nanoscale resolution, 2D Materials, http://doi.org/10.1088/2053-1583/ab41e0
- Phasor-assisted nanoscopy reveals differences in the spatial organization of major nuclear lamina proteins, Biochimica et Biophysica Acta-Molecular Cell Research, http://doi.org/10.1016/j.bbamcr.2019.118530
- Resonant Tunneling Diode Photonics, Morgan & Claypool Publishers, http://doi.org/10.1088/2053-2571/ab3a9a
- Surface charge tunable catanionic vesicles based on serine-derived surfactants as efficient nanocarriers for the delivery of the anticancer drug doxorubicin, Nanoscale, http://doi.org/10.1039/c8nr06346j
- SyncRGB-FLIM: synchronous fluorescence imaging of red, green and blue dyes enabled by ultra-broadband few-cycle laser excitation and fluorescence lifetime detection, Biomedical Optics Express, http://doi.org/10.1364/BOE.10.001891

Water Quality

- A Bio-Inspired Amplification Cascade for the Detection of Rare Cancer Cells, Chimia, http://doi.org/10.2533/chimia.2019.63
- A hydrofluoric acid-free method to dissolve and quantify silica nanoparticles in aqueous and solid matrices, Scientific Reports, http://doi.org/10.1038/s41598-019-44128-z
- Artificial Lysosomal Platform to Study Nanoparticle Long-term Stability, Chimia, http://doi.org/10.2533/chimia.2019.55
- Biocompatibility and bioimaging potential of fruit-based carbon dots, Nanomaterials, http://doi.org/10.3390/nano9020199
- Effectiveness and Safety of a Nontargeted Boost for a CXCR4-Targeted Magnetic Hyperthermia Treatment of Cancer Cells, ACS omega, http://doi.org/10.1021/acsomega.8b02199
- Electrochemical Immunosensor for TNF alpha-Mediated Inflammatory Disease Screening, ACS Chemical Neuroscience, http://doi.org/10.1021/acschemneuro.9b00036
- Gold Nanostars for the Detection of Foodborne Pathogens via Surface-Enhanced Raman Scattering Combined with Microfluidics, ACS Applied Nano Materials, http://doi.org/10.1021/acsanm.9b01223
- Microporous Plasmonic Capsules as Stable Molecular Sieves for Direct SERS Quantification of Small Pollutants in Natural Waters, ChemNanoMat, http://doi.org/10.1002/cnma.201800355
- Nanoparticle administration method in cell culture alters particle-cell interaction, Scientific Reports, http://doi.org/10.1038/s41598-018-36954-4
- Nanoparticle Behaviour in Complex Media: Methods for Characterizing Physicochemical Properties, Evaluating Protein Corona Formation, and Implications for Biological Studies, Biological Responses to Nanoscale Particles, http://doi.org/10.1007/978-3-030-12461-8_5
- Phase Transformation of Superparamagnetic Iron Oxide Nanoparticles via Thermal Annealing: Implications for Hyperthermia Applications, ACS Applied Nano Materials, http://doi.org/10.1021/acsanm.9b00823
- Polymer-Coated Gold Nanospheres Do Not Impair the Innate Immune Function of Human B Lymphocytes in Vitro, ACS Nano, http://doi.org/10.1021/acsnano.9b01492
- Portable sensing system based on electrochemical impedance spectroscopy for the simultaneous quantification of free and total microcystin-LR in freshwaters, Biosensors & Bioelectronics, http://doi.org/10.1016/j.bios.2019.111550
- Quantification of Carbon Nanotube Doses in Adherent Cell Culture Assays Using UV-VIS-NIR Spectroscopy, Nanomaterials, http://doi.org/10.3390/nano9121765
- Recyclable magnetic covalent organic framework for the extraction of marine biotoxins, Nanoscale, http://doi.org/10.1039/C9NR00388F
- Tailoring Covalent Organic Frameworks To Capture Water Contaminants, Chemistry—A European Journal, http://doi.org/10.1002/chem.201806025

2D Materials and devices

- A morphological and electronic study of ultrathin rear passivated Cu(In,Ga)Se-2 solar cells, Thin Solid Films, http://doi.org/10.1016/j.tsf.2018.12.028
- Attomolar Label-Free Detection of DNA Hybridization with Electrolyte-Gated Graphene Field-Effect Transistors, ACS Sensors, http://doi.org/10.1021/acssensors.8b00344
- Electrically Conducting and Mechanically Strong Graphene-Polylactic Acid Composites for 3D Printing, ACS Applied Materials & Interfaces, http://doi.org/10.1021/acsami.9b03241
- Experimental and theoretical evidences for the ice regime in planar artificial spin ices, Journal of Physics-Condensed Matter, http://doi.org/10.1088/1361-648X/aaeeef
- Functionalization of single-layer graphene for immunoassays, Applied Surface Science, http://doi.org/10.1016/j.apsusc.2019.03.004
- Graphene setting the stage: tracking DNA hybridization with nanoscale resolution, 2D Materials, http://doi.org/10.1088/2053-1583/

ab41e0

- Negative thermoelectric power of melt mixed vapor grown carbon nanofiber polypropylene composites, Carbon, http://doi.org/10.1016/j.carbon.2019.05.035
- Rear Optical Reflection and Passivation Using a Nanopatterned Metal/Dielectric Structure in Thin-Film Solar Cells, IEEE Journal of Photovoltaics, http://doi.org/10.1109/JPHOTOV.2019.2922323
- Spin torque nano-oscillator driven by combined spin injection from tunneling and spin Hall current, Communications Physics, http://doi.org/10.1038/s42005-019-0119-7
- Template-directed self-organization of colloidal PbTe nanocrystals into pillars, conformal coatings, and self-supported membranes, Nanoscale Advances, http://doi.org/10.1039/c9na00370c
- Tuning magnetic monopole population and mobility in unidirectional array of nanomagnets as a function of lattice parameters, Applied Physics Letters, http://doi.org/10.1063/1.5088219

Systems Engineering

- Portable sensing system based on electrochemical impedance spectroscopy for the simultaneous quantification of free and total microcystin-LR in freshwaters, Biosensors & Bioelectronics, http://doi.org/10.1016/j.bios.2019.111550

2020

Atomic Manipulation for Quantum Nanotechnology

- Strain-Induced Band-Gap Tuning of 2D-SnSSe Flakes for Application in Flexible Sensors, Advanced Materials Technologies, http://doi.org/10.1002/admt.201900853
- Strong Electronic Coupling between Ultrafine Iridium-Ruthenium Nanoclusters and Conductive, Acid-Stable Tellurium Nanoparticle Support for Efficient and Durable Oxygen Evolution in Acidic and Neutral Media, ACS Catalysis, http://doi.org/10.1021/acscatal.9b05611
- Ultrafine-Grained Porous Ir-Based Catalysts for High-Performance Overall Water Splitting in Acidic Media, ACS Applied Energy Materials, http://doi.org/10.1021/acsaem.0c00201

Electrodynamics of 2D Materials

- Strain-Induced Band-Gap Tuning of 2D-SnSSe Flakes for Application in Flexible Sensors, Advanced Materials Technologies, http://doi.org/10.1002/admt.201900853
- Strong Electronic Coupling between Ultrafine Iridium-Ruthenium Nanoclusters and Conductive, Acid-Stable Tellurium Nanoparticle Support for Efficient and Durable Oxygen Evolution in Acidic and Neutral Media, ACS Catalysis, http://doi.org/10.1021/acscatal.9b05611
- Ultrafine-Grained Porous Ir-Based Catalysts for High-Performance Overall Water Splitting in Acidic Media, ACS Applied Energy Materials, http://doi.org/10.1021/acsaem.0c00201

Food Processing and Nutrition

- 3D printed functional cookies fortified with Arthrospira platensis: Evaluation of its antioxidant potential and physical-chemical characterization, Food Hydrocolloids, http://doi.org/10.1016/j.foodhyd.2020.105893
- Antibacterial Effects of Bimetallic Clusters Incorporated in Amorphous Carbon for Stent Application, ACS Applied Materials & Interfaces, http://doi.org/10.1021/acsami.0c02821
- Bacterial cellulose/cashew gum films as probiotic carriers, LWT-Food Science & Technology, http://doi.org/10.1016/j.lwt.2020.109699
- Bacteriophages for Chronic Wound Treatment: From Traditional to Novel Delivery Systems, Viruses-Basel, http://doi.org/10.3390/v12020235
- Bio-Based Nanoparticles as a Carrier of beta-Carotene: Production, Characterisation and In Vitro Gastrointestinal Digestion, Molecules, http://doi.org/10.3390/molecules25194497
- Carboxymethyl cellulose-based films: Effect of organosolv lignin incorporation on physicochemical and antioxidant properties, Journal of Food Engineering, http://doi.org/10.1016/j.jfoodeng.2020.110107
- Characterization of Enriched Meat-Based Pâté Manufactured with Oleogels as Fat Substitutes, Gels, http://doi.org/10.3390/GELS6020017
- Delonix regia galactomannan-based edible films: Effect of molecular weight and k-carrageenan on physicochemical properties, Food Hydrocolloids, http://doi.org/10.1016/j.foodhyd.2019.105632
- Development and Characterization of Lipid-Based Nanosystems: Effect of Interfacial Composition on Nanoemulsion Behavior, Food and Bioprocess Technology, http://doi.org/10.1007/s11947-019-02372-1
- Development of Active Barrier Multilayer Films Based on Electrospun Antimicrobial Hot-Tack Food Waste Derived Poly(3-hydroxybutyrate-co-3-hydroxyvalerate) and Cellulose Nanocrystal Interlayers, Nanomaterials, http://doi.org/10.3390/nano10122356
- Development of electrospun active films of poly (3-hydroxybutyrate-co-3-hydroxyvalerate) by the incorporation of cyclodextrin inclusion complexes containing oregano essential oil, Food Hydrocolloids, http://doi.org/10.1016/j.foodhyd.2020.106013
- Edible films and coatings as carriers of nano and microencapsulated ingredients, Application of nano/microencapsulated ingredients in food products, http://doi.org/10.1016/B978-0-12-815726-8.00005-2
- Electrosprayed whey protein-based nanocapsules for beta-carotene encapsulation, Food Chemistry, http://doi.org/10.1016/j.foodchem.2019.126157
- Electrospun Active Biopapers of Food Waste Derived Poly(3-hydroxybutyrate-co-3-hydroxyvalerate) with Short-Term and Long-Term Antimicrobial Performance, Nanomaterials, http://doi.org/10.3390/nano10030506
- Entrapment of a phage cocktail and cinnamaldehyde on sodium alginate emulsion-based films to fight food contamination by Escherichia coli and Salmonella Enteritidis, Food Research International, http://doi.org/10.1016/j.foodres.2019.108791

- Escherichia coli and Salmonella Enteritidis dual-species biofilms: interspecies interactions and antibiofilm efficacy of phages, Scientific Reports, http://doi.org/10.1038/s41598-020-59306-7
- Evaluation of linseed oil oleogels to partially replace pork backfat in fermented sausages, Journal of the Science of Food and Agriculture, http://doi.org/10.1002/jsfa.10025
- Evaluation of the specific migration according to EU standards of titanium from Chitosan/Metal complexes films containing TiO2 particles into different food simulants. A comparative study of the nano-sized vs micro-sized particles, Food Packaging and Shelf Life, http://doi.org/10.1016/j.fpsl.2020.100579
- Front passivation of Cu(In,Ga)Se2 solar cells using Al2O3: Culprits and benefits, Applied Materials Today, http://doi.org/10.1016/j.apmt.2020.100867
- Lactoferrin-based nanoemulsions to improve the physical and chemical stability of omega-3 fatty acids, Food & Function, http://doi.org/10.1039/c9fo02307k
- Low peak power deposition regime in HiPIMS: Deposition of hard and dense nanocomposite Ti-Si-N films by DOMS without the need of energetic bombardment, Surface & Coatings Technology, http://doi.org/10.1016/j.surfcoat.2020.125996
- Oleogels for development of health-promoting food products, Food Science and Human Wellness, http://doi.org/10.1016/j.fshw.2019.12.001
- Optimized sample treatment, combined with real-time PCR, for same-day detection of E. coli O157 in ground beef and leafy greens, Food Control, http://doi.org/10.1016/j.foodcont.2019.106790
- Passivation and dissolution mechanisms in ordered anodic tantalum oxide nanostructures, Applied Surface Science, http://doi.org/10.1016/j.apsusc.2020.145575
- Pectin-Based Films Loaded with Hydroponic Nopal Mucilages: Development and Physicochemical Characterization, Coatings, http://doi.org/10.3390/coatings10050467
- Perspective on oleogelator mixtures, structure design and behaviour towards digestibility of oleogels, Current Opinion in Food Science, http://doi.org/10.1016/J.COFS.2020.01.001
- Polymeric nanoparticles as oral delivery systems for a grape pomace extract towards the improvement of biological activities, Materials Science&Engineering C, http://doi.org/10.1016/j.msec.2020.111551
- Printability, microstructure, and flow dynamics of phase-separated edible 3D inks, Food Hydrocolloids, http://doi.org/10.1016/j.foodhyd.2020.106120
- Rhamnolipids-based nanostructured lipid carriers: Effect of lipid phase on physicochemical properties and stability, Food Chemistry, http://doi.org/10.1016/j.foodchem.2020.128670
- Role of Au incorporation in the electrochemical behavior of Ag/a:C nanocomposite coatings, Surface & Coatings Technology, http://doi.org/10.1016/j.surfcoat.2020.126240
- Safety and potential functionality of nanoparticles loaded with a trypsin inhibitor isolated from tamarind seeds, Future Foods, http://doi.org/10.1016/j.fufo.2020.100001
- Self-assembled lipids for food applications: A review, Advances im Colloid and Interface Science, http://doi.org/10.1016/j.cis.2020.102279
- Sensorial Perception of Astringency: Oral Mechanisms and Current Analysis Methods, Foods, http://doi.org/10.3390/foods9081124
- Silica nanocarriers with user-defined precise diameters by controlled template self-assembly, Journal of Colloid and Interface Science, http://doi.org/10.1016/j.jcis.2019.11.036
- Sustainable approach of high-pressure agave bagasse pretreatment for ethanol production, Renewable Energy, http://doi.org/10.1016/j.renene.2020.04.055

Food Quality and Safety

- A smart microfluidic platform for rapid multiplexed detection of foodborne pathogens, Food Control, http://doi.org/10.1016/j.foodcont.2020.107242
- Application of Recombinase Polymerase Amplification with Lateral Flow for a Naked-Eye Detection of Listeria monocytogenes on Food Processing Surfaces, Foods, http://doi.org/10.3390/foods9091249
- Application of Short Pre-enrichment, and Double Chemistry Real-Time PCR, Combining Fluorescent Probes and an Intercalating Dye, for Same-Day Detection and Confirmation of Salmonella spp. and Escherichia coli O157 in Ground Beef and Chicken Samples, Frontiers in Microbiology, http://doi.org/10.3389/fmicb.2020.591041
- Comparative study of multiplexed real-time recombinase polymerase amplification and ISO 11290-1 methods for the detection of Listeria monocytogenes in dairy products, Food Microbiology, http://doi.org/10.1016/j.fm.2020.103570
- Evaluation and implementation of commercial antibodies for improved nanoparticle-based immunomagnetic separation and real-time PCR for faster detection of Listeria monocytogenes, Journal of Food Science and Technology-Mysore, http://doi.org/10.1007/s13197-020-04450-1
- Facile Bacterial Cellulose Nanofibrillation for the Development of a Plasmonic Paper Sensor, ACS Biomaterials Science and Engineering, http://doi.org/10.1021/acsbiomaterials.9b01890
- Green synthesis of lignin nano- and micro-particles: Physicochemical characterization, bioactive properties and cytotoxicity assessment, International Journal of Biological Macromolecules, http://doi.org/10.1016/j.ijbiomac.2020.09.110
- Multifunctional Gold Nanoparticles for the SERS Detection of Pathogens Combined with a LAMP-in-Microdroplets Approach, Materials, http://doi.org/10.2290/ma13081934
- Multiplex Detection of Salmonella spp., E. coli O157 and L. monocytogenes by qPCR Melt Curve Analysis in Spiked Infant Formula, Microorganisms, http://doi.org/10.3390/microorganisms8091359
- Nanostructures in a Dielectric Matrix Providing Optical Enhancement in Ultrathin Solar Cells, Solar RRL, http://doi.org/10.1002/solr.202000310
- New techniques in environment monitoring, Climate Change and Marine and Freshwater Toxins, http://doi.org/10.1515/9783110625738-002
- Optimized sample treatment, combined with real-time PCR, for same-day detection of E. coli O157 in ground beef and leafy greens, Food Control http://doi.org/10.1016/j.foodcont.2019.106790
- Photoelectrochemical Detection of -amyloid Peptides by a TiO2 Nanobrush Biosensor, IEEE Sensors Journal, http://doi.org/10.1109/JSEN.2020.2976561
- Profiling DNA mutation patterns by SERS fingerprinting for supervised cancer classification, Biosensors & Bioelectronics, http://doi.org/10.1016/j.bios.2020.112392
- ZnO-Nanorod processed PC-SET as the light-harvesting model for plasmontronic fluorescence Sensor, Sensors and Actuators B: Chemical, http://doi.org/10.1016/j.snb.2019.127597

Integrated Micro and Nanotechnologies

- Fabrication of a MEMS Micromirror Based on Bulk Silicon Micromachining Combined With Grayscale Lithography, Journal of Microelectromechanical Systems, http://doi.org/10.1109/JMEMS.2020.3006746
- Gray-Code TDC with Improved Linearity and Scalability for LiDAR applications, 6th International Conference on Event-Based Control, Communication, and Signal Processing (EBCCSP), http://doi.org/10.1109/EBCCSP51266.2020.9291359
- Highly sensitive MEMS frequency modulated accelerometer with small footprint. Sensors and Actuators A: Physical, http://doi.org/10.1109/MEMS46641.2020.9056126
- Industry 4.0: Real-time monitoring of an injection molding tool for smart predictive maintenance, 25th IEEE International Conference on Emerging Technologies and Factory Automation (ETFA), http://doi.org/10.1109/ETFA46521.2020.9212167

- Influence of Mechanical Stress in a Packaged Frequency-Modulated MEMS Accelerometer, 7th IEEE International Symposium on Inertial Sensors and Systems, http://doi.org/10.1109/inertial48129.2020.9090090
- Organ-on-a-Chip: A Preclinical Microfluidic Platform for the Progress of Nanomedicine, Small, http://doi.org/10.1002/smll.202003517
- Surface Texture Detection With a New Sub-mm Resolution Flexible Tactile Capacitive Sensor Array for Multimodal Artificial Finger, Journal of Microelectromechanical Systems, http://doi.org/10.1109/JMEMS.2020.3004584
- Technology Independent ASIC Based Time to Digital Converter, IEEE Access, http://doi.org/10.1109/ACCESS.2020.3034522

Laboratory for Nanostructured Solar Cells

- Chemical instability at chalcogenide surfaces impacts chalcopyrite devices well beyond the surface, Nature Communications http://doi.org/10.1038/s41467-020-17434-8
- Design and Characterization of 3D Self-folded Micro Antennas for Implantable Microdevices, IEEE Transactions on Antennas and Propagation, http://doi.org/10.1109/TAP.2019.2948741
- Heavy Alkali Treatment of Cu(In,Ga)Se-2 Solar Cells: Surface versus Bulk Effects, Advanced Energy Materials, http://doi.org/10.1002/aenm.201903752
- Micro-sized thin-film solar cells via area-selective electrochemical deposition for concentrator photovoltaics application, Scientific Reports, http://doi.org/10.1038/s41598-020-71717-0
- Over 6% Efficient Cu(In,Ga)Se-2 Solar Cell Screen-Printed from Oxides on Fluorine-Doped Tin Oxide, ACS Applied Energy Materials, http://doi.org/10.1021/acsaem.9b01999
- System for manufacturing complete Cu(In,Ga)Se-2 solar cells in situ under vacuum, Solar Energy, http://doi.org/10.1016/j.solener.2020.01.073

Medical Devices

- A SERS-based 3D nanobiosensor: towards cell metabolite monitoring, Materials Advances, http://doi.org/10.1039/D0MA00121J
- A smart microfluidic platform for rapid multiplexed detection of foodborne pathogens, Food Control, http://doi.org/10.1016/j.foodcont.2020.107242
- Circulating Tumour Cells: A Portuguese contribution towards Precision Medicine, Revista Portuguesa de Cirurgia, http://doi.org/10.24625/rpc.806
- Comparability of Raman Spectroscopic Configurations: A Large Scale Cross-Laboratory Study, Analytical Chemistry, http://doi.org/10.1021/acs.analchem.0c02696
- Correlative fluorescence and atomic force microscopy to advance the bio-physical characterisation of co-culture of living cells, Biochemical and Biophysical Research Communications, http://doi.org/10.1016/j.bbrc.2020.06.037
- Encapsulation of Nanostructures in a Dielectric Matrix Providing Optical Enhancement in Ultrathin Solar Cells, Solar RLL, http://doi.org/10.1002/solr.202000310
- Facile synthesis of an aminopropylsilane layer on Si/SiO2 substrates using ethanol as APTES solven, MethodsX, http://doi.org/10.1016/j.mex.2020.100931
- Fluorescencecross-correlation spectroscopy as a valuable tool to characterize cationicliposome-DNAnanoparticle assembly, Journal of Biophotonics, http://doi.org/10.1002/jbio.202000200
- In Vitro Evaluation of Lipopolyplexes for Gene Transfection: Comparing 2D, 3D and Microdroplet-Enabled Cell Culture, Molecules, http://doi.org/10.3390/molecules25143277
- Phenotypic Analysis of Urothelial Exfoliated Cells in Bladder Cancer via Microfluidic Immunoassays: Sialyl-Tn as a Novel Biomarker in Liquid Biopsies. Frontiers in Oncology. http://doi.org/10.3389/fonc.2020.01774

Nanochemistry

- 1D materials from ionic self-assembly in mixtures containing chromonic liquid crystal mesogens, Physical Chemistry Chemical Physics, http://doi.org/10.1039/d0cp04348f
- Coagulating and flocculating ferrihydrite: application of zinc acetate salt, Environmental Science – Water Research & Technology, http://doi.org/10.1039/d0ew00357c
- Combined experimental and theoretical study of acetylene semi-hydrogenation over Pd/Al2O3, International Journal of Hydrogen Energy, http://doi.org/10.1016/j.ijhydene.2019.04.086
- Covalent Organic Framework Composites: Synthesis and Analytical Applications, Molecules, http://doi.org/10.3390/molecules25225404
- Crystallographic facet selective HER catalysis: exemplified in FeP and NiP2 single crystals, Chemical Science, http://doi.org/10.1039/d0sc00676a
- Defect Engineering for Enhancement of Thermoelectric Performance of (Zr, Hf)NiSn-Based n-type Half-Heusler Alloys, Journal of Physical Chemistry C, http://doi.org/10.1021/acs.jpcc.0c00681
- Discovery of Real-Space Topological Ferroelectricity in Metallic Transition Metal Phosphides, Advanced Materials, http://doi.org/10.1002/adma.202003479
- Efficient adsorption of endocrine-disrupting pesticides from water with a reusable magnetic covalent organic framework, Microporous and Mesoporous Materials, http://doi.org/10.1016/j.micromeso.2020.110523
- Enhanced oxygen evolution catalysis by aluminium-doped cobalt phosphide through in situ surface area increase, Catalysis Science & Technology, http://doi.org/10.1039/d0cy00123f
- Extraction of Ibuprofen from Natural Waters Using a Covalent Organic Framework, Molecules, http://doi.org/10.3390/molecules25143132
- Facile bulk synthesis of high performance beta-Zn4Sb3 for thermoelectric applications, Materials Letters, http://doi.org/10.1016/j.atlet.2020.127428
- FeP Nanocatalyst with Preferential [010] Orientation Boosts the Hydrogen Evolution Reaction in Polymer-Electrolyte Membrane Electrolyzer, Energy & Fuels, http://doi.org/10.1021/acs.energyfuels.0c00793
- Over 6% Efficient Cu(In,Ga)Se-2 Solar Cell Screen-Printed from Oxides on Fluorine-Doped Tin Oxide, ACS Applied Energy Materials, http://doi.org/10.1021/acsaem.9b01999
- PEGylated perylene bisimides: chromonic building blocks for the aqueous preparation of nanostructured silica materials, Journal of Molecular Liquids, http://doi.org/10.1016/j.molliq.2020.114657
- Scalable colloidal synthesis of Bi2Te2.7Se0.3 plate-like particles give access to a high-performing n-type thermoelectric material for low temperature application, Nanoscale Advances, http://doi.org/10.1039/d0na00691b
- Selective formic acid dehydrogenation at low temperature over a RuO2/COF pre-catalyst synthesized on the gram scale, Catalysis Science & Technology, http://doi.org/10.1039/d0cy00145g
- Selectivity boost in partial hydrogenation of acetylene via atomic dispersion of platinum over ceria, Catalysis Science & Technology, http://doi.org/10.1039/d0cy01592j
- Structural properties of PbTe quantum dots revealed by high-energy x-ray diffraction, Journal of Physics: Condensed Matter, http://doi.org/10.1088/1361-648X/abaa80
- Structure of Manganese Oxide Nanoparticles Extracted via Pair Distribution Functions, Condensed Matter, http://doi.org/10.3390/condmat5010019
- Synergistic Computational-Experimental Discovery of Highly Selective PtCu Nanocluster Catalysts for Acetylene Semihydrogenation, ACS Catalysis, http://doi.org/10.1021/acscatal.9b03539
- The role of surface properties in CO2 methanation over carbon-supported Ni catalysts and their promotion by Fe, Catalysis Science & Technology, http://doi.org/10.1039/d0cy01254h

Nanodevices

- Assessment of potato peel and agro-forestry biochars supplementation on in vitro ruminal fermentation, PeerJ, http://doi.org/10.7717/peerj.9488
- Clean-Room Lithographical Processes for the Fabrication of Graphene Biosensors, Materials, http://doi.org/10.3390/ma13245728
- Development of Organoid-on-a-chip Platform for Preclinical Drug Screening, 5th World Congress on Recent Advances in Nanotechnology (RAN'20), http://doi.org/10.11159/nddte20.117
- Digital and analogue modulation and demodulation scheme using vortex-based spin torque nano-oscillators, Scientific Reports, http://doi.org/10.1038/s41598-020-68001-6
- Effects of magnetic monopoles charge on the cracking reversal processes in artificial square ices, Scientific Reports, http://doi.org/10.1038/s41598-020-66794-0
- Facile Bacterial Cellulose Nanofibrillation for the Development of a Plasmonic Paper Sensor, ACS Biomaterials Science and Engineering, http://doi.org/10.1021/acsbiomaterials.9b01890
- Fluorescencecross-correlation spectroscopy as a valuable tool to characterize cationicliposome-DNAnanoparticle assembly, Journal of Biophotonics, http://doi.org/10.1002/jbio.202000200
- In Vitro Evaluation of Lipopolyplexes for Gene Transfection: Comparing 2D, 3D and Microdroplet-Enabled Cell Culture, Molecules, http://doi.org/10.3390/molecules25143277
- Integrated Pico-Tesla Resolution Magnetoresistive Sensors for Miniaturised Magnetomyography, 42nd Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC), http://doi.org/10.1109/EMBC44109.2020.9176266
- Lipid-Nucleic Acid Complexes: Physicochemical Aspects and Prospects for Cancer Treatment, Molecules, http://doi.org/10.3390/molecules25215006
- Non-invasive molecular assessment of human embryo development and implantation potential, Biosensors & Bioelectronics, http://doi.org/10.1016/j.bios.2020.112144
- Opportunities and challenges for spintronics in the microelectronics industry, Nature Electronics, http://doi.org/10.1038/s41928-020-0461-5
- Phenotypic Analysis of Urothelial Exfoliated Cells in Bladder Cancer via Microfluidic Immunoassays: Sialyl-Tn as a Novel Biomarker in Liquid Biopsies, Frontiers in Oncology, http://doi.org/10.3389/fonc.2020.01774
- Point-of-care quantification of serum cellular fibronectin levels for stratification of ischemic stroke patients, Nanomedicine-nanotechnology Biology and Medicine, http://doi.org/10.1016/j.nano.2020.102287
- Rapidly dissolving microneedles for the delivery of cubosome-like liquid crystalline nanoparticles with sustained release of rapamycin, International Journal of Pharmaceutics, http://doi.org/10.1016/j.ijpharm.2020.119942
- Rhamnolipids-based nanostructured lipid carriers: Effect of lipid phase on physicochemical properties and stability, Food Chemistry, http://doi.org/10.1016/j.foodchem.2020.128670
- Spintronic Sensors Based on Magnetic Tunnel Junctions for Wireless Eye Movement Gesture Control, IEEE Transactions on Biomedical Circuits and Systems, http://doi.org/10.1109/TBCAS.2020.3027242
- Wideband High-Resolution Frequency-to-Resistance Converter Based on Nonhomogeneous Magnetic-State Transitions, Physical Review Applied, http://doi.org/10.1103/PhysRevApplied.13.014046
- ZnO-Nanorod processed PC-SET as the light-harvesting model for plasmontronic fluorescence Sensor, Sensors and Actuators B: Chemical, http://doi.org/10.1016/j.snb.2019.127597

Nanofabrication for optoelectronic applications

- CdS versus ZnSnO buffer layers for a CIGS solar cell: a depth-resolved analysis using the muon probe, EPJ Web of Conferences, http://doi.org/10.1051/epjconf/202023305004
- Electronic Conduction Mechanisms and Defects in Polycrystalline Antimony Selenide, Journal of Physical Chemistry C, http://doi.org/10.1021/acs.jpcc.0c00398
- Encapsulation of Nanostructures in a Dielectric Matrix Providing Optical Enhancement in Ultrathin Solar Cells, SOLAR RRL, http://doi.org/10.1002/solr.202000310
- Front passivation of Cu(In,Ga)Se2 solar cells using Al2O3: Culprits and benefits, Applied Materials Today, http://doi.org/10.1016/j.apmt.2020.100867
- Muon implantation experiments in films: Obtaining depth-resolved information, Review of Scientific Instruments, http://doi.org/10.1063/1.5126529
- Optimization of Back Contact Grid Size in Al2O3-Rear-Passivated Ultrathin CIGS PV Cells by 2-D Simulations, IEEE Journal of Photovoltaics, http://doi.org/10.1109/JPHOTOV.2020.3012631
- Recombination Channels in Cu(In,Ga)Se-2 Thin Films: Impact of the Ga-Profile, Journal of Physical Chemistry C, http://doi.org/10.1021/acs.jpcc.0c02622

Nanomaterials for Energy Storage and Conversion

- Bamboo-like nitrogen-doped carbon nanotubes encapsulated with NiFeP nanoparticles and their efficient catalysis in the oxygen evolution reaction, Electrochimica Acta, http://doi.org/10.1016/j.electacta.2019.135360
- Bifunctional Porous Cobalt Phosphide Foam for High-Current-Density Alkaline Water Electrolysis with 4000-h Long Stability, ACS Sustainable Chemistry & Engineering, http://doi.org/10.1021/acssuschemeng.0c02671
- Bi-metallic cobalt-nickel phosphide nanowires for electrocatalysis of the oxygen and hydrogen evolution reactions, Catalysis Today, http://doi.org/10.1016/j.cattod.2019.05.037
- Decoding of Oxygen Network Distortion in a Layered High-Rate Anode by In Situ Investigation of a Single Microelectrode, ACS Nano, http://doi.org/10.1021/acsnano.0c04483
- Discovery of Real-Space Topological Ferroelectricity in Metallic Transition Metal Phosphides, Advanced Materials, http://doi.org/10.1002/adma.202003479
- Mille-Crêpe-Like Metal Phosphide Nanocrystals/Carbon Nanotube Film Composites as High-Capacitance Negative Electrodes in Asymmetric Supercapacitors" ACS Applied Energy Materials, http://doi.org/10.1021/acsaem.0c00263
- Nitrogen doping improves the immobilization and catalytic effects of Co9S8 in Li-S batteries, Advanced Functional Materials, http://doi.org/10.1002/adfm.202002462
- One-step fabrication of self-supported Co@CoTe2 electrocatalyst for efficient and durable oxygen evolution reaction, Inorganic Chemistry Frontiers, http://doi.org/10.1039/D0QI00372G
- Proteomic and metabolic elucidation of solar-powered biomanufacturing by bio-abiotic hybrid system, Chem, http://doi.org/10.1016/j.chempr.2019.11.002
- Self-epitaxial homo-nanolayers and surface atom reconstruction in electrocatalytic nickel phosphides, ACS Applied Materials & Interfaces, http://doi.org/10.1021/acsami.0c03154
- Stable overall water splitting in an asymmetric acid/alkaline electrolyzer comprising a bipolar membrane sandwiched by bifunctional cobalt nickel phosphide nanowire electrodes, Carbon Energy, http://doi.org/10.1002/cey2.56
- Strategies for semiconductor/electrocatalysts coupling toward solar-driven water splitting, Advanced Science 2020, http://doi.org/10.1002/advs.201902102
- Strong Electronic Coupling between Ultrafine Iridium-Ruthenium Nanoclusters and Conductive, Acid-Stable Tellurium Nanoparticle Support for Efficient and Durable Oxygen Evolution in Acidic and Neutral Media, ACS Catalysis, http://doi.org/10.1021/acscatal.9b05611
- Ultrafine oxygen-defective iridium oxide nanoclusters for efficient and durable water oxidation at high current densities in acidic media, Journal of Materials Chemistry A, http://doi.org/10.1039/d0ta07093a
- Ultrafine-Grained Porous Ir-Based Catalysts for High-Performance Overall Water Splitting in Acidic Media, ACS Applied Energy Materials, http://doi.org/10.1021/acsaem.0c00201

Nanomedicine

- (Para)magnetic hybrid nanocomposites for dual MRI detection and treatment of solid tumours, Chemical Communications, http://doi.org/10.1039/d0cc03020a
- A multifunctional nanomedicine platform for co-delivery of methotrexate and mild hyperthermia towards breast cancer therapy, Materials Science & Engineering C, http://doi.org/10.1016/j.msec.2020.111255
- Bacteriophages for Chronic Wound Treatment: From Traditional to Novel Delivery Systems, Viruses-Basel, http://doi.org/10.3390/v12020235
- Characterization of MSlys, the endolysin of Streptococcus pneumoniae phage MS1, Biotechnology Reports, http://doi.org/10.1016/j.btre.2020.e00547
- Chemical preparation, crystal structure, Hirshfeld surface analysis, spectroscopy, DFT studies, thermal decomposition and magnetic measurements of (C4H12N2)[FeCl3(H2O)(3)]Cl-2, Inorganic Chemistry Communications, http://doi.org/10.1016/j.inoche.2019.107748
- Dye-doped biodegradable nanoparticle SiO2 coating on zinc- and iron-oxide nanoparticles to improve biocompatibility and for in vivo imaging studies, Nanoscale, http://doi.org/10.1039/c9nr08743e
- Entrapment of a phage cocktail and cinnamaldehyde on sodium alginate emulsion-based films to fight food contamination by Escherichia coli and Salmonella Enteritidis, Food Research International, http://doi.org/10.1016/j.foodres.2019.108791
- Escherichia coli and Salmonella Enteritidis dual-species biofilms: interspecies interactions and antibiofilm efficacy of phages, Scientific Reports, http://doi.org/10.1038/s41598-020-59306-7
- Evaluation of Novel Doxorubicin-Loaded Magnetic Wax Nanocomposite Vehicles as Cancer Combinatorial Therapy Agents, Pharmaceutics, http://doi.org/10.3390/pharmaceutics12070637
- Inactivation of Pseudomonas aeruginosa in mineral water by DP1 bacteriophage immobilized on ethylene-vinyl acetate copolymer used as seal caps of plastic bottles, Journal of Applied Polymer Science, http://doi.org/10.1002/app.49009
- Magnetic Hybrid Wax Nanocomposites as Externally Controlled Theranostic Vehicles: High MRI Enhancement and Synergistic Magnetically Assisted Thermo/Chemo Therapy, Chemistry - A European Journal, http://doi.org/10.1002/chem.202000810
- Mapping intracellular thermal response of cancer cells to magnetic hyperthermia treatment, Nanoscale, http://doi.org/10.1002/chem.202000810
- Organ-on-a-Chip: A Preclinical Microfluidic Platform for the Progress of Nanomedicine, Small, http://doi.org/10.1002/smll.202003517
- Porous composites based on cellulose acetate and alfa-hematite with optical and antimicrobial properties, Carbohydrate Polymers, http://doi.org/10.1016/j.carbpol.2020.116362
- Structure of Manganese Oxide Nanoparticles Extracted via Pair Distribution Functions, Condensed Matter, http://doi.org/10.3390/condmat5010019
- Synthesis, Characterization, and Evaluation of Superparamagnetic Doped Ferrites as Potential Therapeutic Nanotools, Chemistry of Materials, http://doi.org/10.1021/acs.chemmater.9b04848
- The Protective Effect of Staphylococcus epidermidis Biofilm Matrix against Phage Predation, Viruses-Basel, http://doi.org/10.3390/v12101076

Nanostructured Materials

- A one-pot route to stable Pickering emulsions featuring nanocrystalline Ag and Au, Chemical Communications, http://doi.org/10.1039/d0cc00967a
- In situ generation of sub-10 nm silver nanowires under electron beam irradiation in a TEM, Chemical Communications, http://doi.org/10.1039/d0cc00909a
- Micro-sized thin-film solar cells via area-selective electrochemical deposition for concentrator photovoltaics application, Scientific Reports, http://doi.org/10.1038/s41598-020-71717-0
- Selectivity boost in partial hydrogenation of acetylene via atomic dispersion of platinum over ceria, Catalysis Science & Technology, http://doi.org/10.1039/d0cy01592j
- Ultrafine-Grained Porous Ir-Based Catalysts for High-Performance Overall Water Splitting in Acidic Media, ACS Applied Energy Materials, http://doi.org/10.1021/acsaem.0c00201

Precision Medicine Engineering

- Engineering of 2D transition metal carbides and nitrides MXenes for cancer therapeutics and diagnostics, Journal of Materials Chemistry B, doi.org/10.1039/d0tb00251h
- Graphene-based biosensor for Viral Detection, arXiv, doi.org/10.48550/arXiv.2006.11881
- Machine learning assistive rapid, label-free molecular phenotyping of blood with two-dimensional NMR correlational spectroscopy, Communications Biology, http://doi.org/10.1038/s42003-020-01262-z
- Molecular phenotyping of oxidative stress in diabetes mellitus with point-of-care NMR system, NPJ Aging and Mechanisms of Diseases, http://doi.org/10.1038/s41514-020-00049-0
- Rapid phenotyping towards personalized malaria medicine, Malaria Journal, http://doi.org/10.1186/s12936-020-3149-4

Quantum and Linear-Optical Computation

- Experimental quantification of four-photon indistinguishability, New Journal of Physics, http://doi.org/10.1088/1367-2630/ab7a30
- Quantum and classical bounds for two-state overlaps, Physical Review A, http://doi.org/10.1103/PhysRevA.101.062110

Quantum Software Engineering

- Simulation of nonradiative energy transfer in photosynthetic systems using a quantum computer, Complexity, http://doi.org/10.1155/2020/3510676

Spintronics

- Detection of the Microwave Emission from a Spin-Torque Oscillator by a Spin Diode, Physical Review Applied, http://doi.org/10.1103/PhysRevApplied.13.044050
- Digital and analogue modulation and demodulation scheme using vortex-based spin torque nano-oscillators, Scientific Reports, doi.org/10.1038/s41598-020-68001-6
- LAO-NCS: Laser assisted spin torque nano oscillator-based neuromorphic computing system, Frontiers in Neuroscience, http://doi.org/10.1038/s41598-020-68001-6
- Spintronic Sensors Based on Magnetic Tunnel Junctions for Wireless Eye Movement Gesture Control, IEEE Transactions on Biomedical Circuits and Systems, http://doi.org/10.1109/TBCAS.2020.3027242
- Ultrafast sweep-tuned spectrum analyzer with temporal resolution based on a spin-torque nano-oscillator, Nano Letters, http://doi.org/10.1021/acs.nanolett.0c02195
- Wideband High-Resolution Frequency-to-Resistance Converter Based on Nonhomogeneous Magnetic-State Transitions, Physical Review Applied, http://doi.org/10.1103/PhysRevApplied.13.014046

Theory of Quantum Nanostructures

- Berry phase estimation in gate-based adiabatic quantum simulation, Physical Review A, http://doi.org/10.1103/PhysRevA.101.020302
- Collective All-Carbon Magnetism in Triangulene Dimers, Angewandte Chemie-International Edition, http://doi.org/10.1002/anie.202002687
- Emergent quantum matter in graphene nanoribbons, Graphene Nanoribbons, http://doi.org/10.1088/978-0-7503-1701-6ch4
- Excitonic magneto-optical Kerr effect in 2D transition metal dichalcogenides induced by spin proximity, Physical Review B, http://doi.org/10.1103/PhysRevB.101.045408
- Interplay between spin proximity effect and charge-dependent exciton dynamics in MoSe2/CrBr3 van der Waals heterostructures, Nature Communications, http://doi.org/10.1038/s41467-020-19816-4
- Magnetic Two-Dimensional Chromium Trihalides: A Theoretical Perspective, Nano Letters, http://doi.org/10.1021/acs.nanolett.0c02381
- Magneto-optical Kerr effect in spin split two-dimensional massive Dirac materials, 2D Materials, http://doi.org/10.1088/2053-1583/ab6781
- Magneto-optical response of chromium trihalide monolayers: chemical trends, Journal of Materials Chemistry C, http://doi.org/10.1039/d0tc01322f
- Nonreciprocal magnons in a two-dimensional crystal with out-of-plane magnetization, Physical Review B, http://doi.org/10.1103/PhysRevB.102.014450
- Optimizing quantum phase estimation for the simulation of Hamiltonian eigenstates, Quantum Sience and Technology, http://doi.org/10.1088/2058-9565/abaa2c
- Probing local moments in nanographenes with electron tunneling spectroscopy, Progress in Surface Science, http://doi.org/10.1016/j.progsurf.2020.100595
- Quantum Confinement of Dirac Quasiparticles in Graphene Patterned with Sub-Nanometer Precision, Advanced Materials, http://doi.org/10.1002/adma.202001119
- Topological magnons in CrI(3)monolayers: an itinerant fermion description, 2D Materials, http://doi.org/10.1088/2053-1583/aba88f

Ultrafast bio- and Nanophotonics

- CLeANFIT - Contact-Less Axial Nearfield-Based Fluorescence Imaging Topography: A Method for 3D Micro- and Nanotopography Characterization, Advanced Materials Interfaces, http://doi.org/10.1002/admi.202000581
- Efficient light extraction in subwavelength GaAs/AlGaAs nanopillars for nanoscale light-emitting devices, Optics Express, http://doi.org/10.1364/OE.402887
- Environmentally friendly luminescent solar concentrators based on an optically efficient and stable green fluorescent protein, Green Chemistry, http://doi.org/10.1039/d0gc01742f
- Fabrication and characterization of luminescent Pr^{3+} doped fluorapatite nanocrystals as bioimaging contrast agents, Journal of Luminescence, http://doi.org/10.1016/j.jlumin.2019.116757
- Mapping intracellular thermal response of cancer cells to magnetic hyperthermia treatment, Nanoscale, http://doi.org/10.1039/c9nr10370h
- Mode-field switching of nanolasers, APL Photonics, http://doi.org/10.1063/5.0006767
- Multi-beam two-photon polymerization for fast large area 3D periodic structure fabrication for bioapplications, Scientific Reports, http://doi.org/10.1038/s41598-020-64955-9
- NanoLEDs for energy-efficient and gigahertz-speed spike-based sub-lambda neuromorphic nanophotonic computing, Nanophotonics, http://doi.org/10.1515/nanoph-2020-0177
- Physical Limits of NanoLEDs and Nanolasers for Optical Communications, Proceedings of the IEEE, http://doi.org/10.1109/JPROC.2019.2912293
- Prediction of paclitaxel pharmacokinetic based on in vitro studies: Interaction with membrane models and human serum albumin, International Journal of Pharmaceutics, http://doi.org/10.1016/j.ijpharm.2020.119222

Water Quality

- A comparative study of silver nanoparticle dissolution under physiological conditions, Nanoscale Advances, http://doi.org/10.1039/d0na00733a
- A SERS-based 3D nanobiosensor: towards cell metabolite monitoring, Materials Advances, http://doi.org/10.1039/D0MA00121J
- Are TiO2 nanoparticles safe for photocatalysis in aqueous media?, Nanoscale Advances, http://doi.org/10.1039/d0na00584c
- Covalent Organic Framework Composites: Synthesis and Analytical Applications, Molecules, http://doi.org/10.3390/molecules25225404
- Efficient adsorption of endocrine-disrupting pesticides from water with a reusable magnetic covalent organic framework, Microporous and Mesoporous Materials, http://doi.org/10.1016/j.micromeso.2020.110523
- Extraction of Ibuprofen from Natural Waters Using a Covalent Organic Framework, Molecules, http://doi.org/10.3390/molecules25143132
- Improved Photocatalyzed Degradation of Phenol, as a Model Pollutant, over Metal-Impregnated Nanosized TiO2, Nanomaterilas, http://doi.org/10.3390/nano10050996
- Magnetic Hyperthermia for Cancer Treatment: Main Parameters Affecting the Outcome of In Vitro and In Vivo Studies, Molecules, http://doi.org/10.3390/molecules25122874
- New techniques in environment monitoring, Climate Change and Marine and Freshwater Toxins, http://doi.org/10.1515/9783110625738-002
- Particle Surfaces to Study Macrophage Adherence, Migration, and Clearance, Advanced Functional Materials, http://doi.org/10.1002/adfm.202002630

2D Materials and devices

- 2D semiconducting materials for electronic and optoelectronic applications: potential and challenge, 2D Materials, http://doi.org/10.1088/2053-1583/ab6267
- Clean-Room Lithographical Processes for the Fabrication of Graphene Biosensors, Materials, http://doi.org/10.3390/ma13245728
- Double grain boundary configurations on graphite surfaces, Carbon, http://doi.org/10.1016/j.carbon.2020.08.046
- Effects of magnetic monopoles charge on the cracking reversal processes in artificial square ices, Scientific Reports, http://doi.org/10.1038/s41598-020-66794-0
- Efficient light extraction in subwavelength GaAs/AlGaAs nanopillars for nanoscale light-emitting devices, Optics Express, http://doi.org/10.1364/OE.402887
- Field-effect transistors made of graphene grown on recycled copper foils, Materials Chemistry and Physics, http://doi.org/10.1016/j.matchemphys.2020.123665
- Highly flexible graphene nanoplatelet-polydimethylsiloxane strain sensors with proximity-sensing capability, Materials Research Express, http://doi.org/10.1088/2053-1591/ab80e9
- Multi-beam two-photon polymerization for fast large area 3D periodic structure fabrication for bioapplications, Scientific Reports, http://doi.org/10.1038/s41598-020-64955-9
- Over 6% Efficient Cu(In,Ga)Se-2 Solar Cell Screen-Printed from Oxides on Fluorine-Doped Tin Oxide, ACS Applied Energy Materials, http://doi.org/10.1021/acsaem.9b01999
- Raman Spectroscopy for Tumor Diagnosis in Mammary Tissue, Proceedings of the 8th International Conference on Photonics, Optics and Laser, Technology (Photoptics), http://doi.org/10.5220/0009093501310134
- Rational Design of Photo-Electrochemical Hybrid Devices Based on Graphene and Chlamydomonas reinhardtii Light-Harvesting Proteins, Scientific Reports, http://doi.org/10.1038/s41598-020-60408-5
- Recent Advancements on the CVD of Graphene on Copper from Ethanol Vapor, C-Journal of Carbon Research, http://doi.org/10.3390/c6010014

2021

Atomic Manipulation for Quantum Nanotechnology

- Role of sublimation kinetics of ammonia borane in chemical vapor deposition of uniform, large-area hexagonal boron nitride, Journal of Vacuum Science & Technology, http://doi.org/10.1116/6.0000987

Atomic structure-composition of materials

- Carbide-Supported PtRu Catalysts for Hydrogen Oxidation Reaction in Alkaline Electrolyte, ACS Catalysis, http://doi.org/10.1021/acscatal.0c03973
- MC3T3-E1 cell response to microporous tantalum oxide surfaces enriched with Ca, P and Mg, Materials Science & Engineering C, http://doi.org/10.1016/j.msec.2021.112008
- Tuning Coherent-Phonon Heat Transport in LaCoO3/SrTiO3 Superlattices, The Journal of Physical Chemistry Letters, http://doi.org/10.1021/acs.jpclett.1c03418

Electrodynamics of 2D Materials

- Analytical description of the 1s exciton linewidth temperature dependence in transition metal dichalcogenides, Physical Review B, http://doi.org/10.1103/PhysRevB.103.235402
- Calculation of the nonlinear response functions of intraexciton transitions in two-dimensional transition metal dichalcogenides, Physical Review B, http://doi.org/10.1103/PhysRevB.103.235412
- Exciton energies and wave functions in hexagonal boron nitride using Miller and Good's uniform approach, European Physical Journal B, http://doi.org/10.1140/epjb/s10051-020-00014-6
- Exciton-polariton mediated interaction between two nitrogen-vacancy color centers in diamond using two-dimensional transition metal dichalcogenides, Physical Review B, http://doi.org/10.1103/PhysRevB.103.085407
- Harnessing ultraconfined graphene plasmons to probe the electrodynamics of superconductors, Proceedings of the National, Proceedings of the National Academy of Sciences of the United States of America, http://doi.org/10.1073/pnas.2012847118
- Ionization rate and Stark shift of a one-dimensional model of the hydrogen molecular ion, European Journal of Physics, http://doi.org/10.1088/1361-6404/abc40e
- Localized polariton states in a photonic crystal intercalated by a transition metal dichalcogenide monolayer, Journal of the Optical Society of America B – Optical Physics, http://doi.org/10.1364/JOSAB.427940
- Nanometer-scale cavities for mid-infrared light based on graphene plasmons, Optical Sensors, http://doi.org/10.1117/12.2590037
- Perturbative approach to the polaron shift of excitons in transition metal dichalcogenides, Physical Review B, http://doi.org/10.1103/PhysRevB.103.L161402
- Plasmonic response of a nanorod in the vicinity of a metallic surface: local approach with analytical solution, Journal of Optics, http://doi.org/10.1088/2040-8986/ac1904
- Quantum Nanophotonics in Two-Dimensional Materials, ACS Photonics, http://doi.org/10.1021/acsphotonics.0c01224
- The polarizability of a confined atomic system: an application of the Dalgarno-Lewis method, European Journal of Physics, http://doi.org/10.1088/1361-6404/abfd24
- Theoretical model of the polarizability due to transitions between exciton states in transition metal dichalcogenides: application to WSe2, Journal of the Optical Society of America B, http://doi.org/10.1364/JOSAB.421279
- Third-order polarizability of interlayer excitons in heterobilayers, Physical Review B, http://doi.org/10.1103/PhysRevB.104.20543
- Topological Graphene Plasmons in a Plasmonic Realization of the Su-Schrieffer-Heeger Model, ACS Photonics, http://doi.org/10.1021/acsphotonics.1c00417
- Two-level systems coupled to Graphene plasmons: A Lindblad equation approach, International Journal of Modern Physics B, http://doi.org/10.1142/S0217979221300073

Food Processing and Nutrition

- A Review on the Role of Food-Derived Bioactive Molecules and the Microbiota-Gut-Brain Axis in Satiety Regulation, Nutrients, http://doi.org/10.3390/nu13020632
- Active Carboxymethylcellulose-Based Edible Films: Influence of Free and Encapsulated Curcumin on Films' Properties, Foods, http://doi.org/10.3390/foods10071512
- Characterization of PHBV films loaded with FO1 bacteriophage using polyvinyl alcohol-based nanofibers and coatings: A comparative study, Innovative Food Science & Emerging Technologies, http://doi.org/10.1016/j.ifset.2021.102646
- Editorial: Structured Edible Oil: Towards a New Generation of Fat Mimetics, Frontiers in Sustainable Food Systems, http://doi.org/10.3389/fsufs.2021.652644
- Effect of Biodegradable Hydrophilic and Hydrophobic Emulsifiers on the Oleogels Containing Sunflower Wax and Sunflower Oil, Gels, http://doi.org/10.3390/gels7030133
- Electrohydrodynamic processing for the production of zein-based microstructures and nanostructures, Current Opinion in Colloid & Interface Science, http://doi.org/10.1016/j.cocis.2021.101504
- Faster monitoring of the invasive alien species (IAS) Dreissena polymorpha in river basins through isothermal amplification, Scientific Reports, http://doi.org/10.1038/s41598-021-89574-w
- Food-grade hydroxypropyl methylcellulose-based formulations for electrohydrodynamic processing: Part I & ndash; Role of solution parameters on fibre and particle production, Food hydrocolloids, http://doi.org/10.1016/j.foodhyd.2021.106761
- How additive manufacturing can boost the bioactivity of baked functional foods, Journal of Food Engineering, http://doi.org/10.1016/j.jfoodeng.2020.110394
- Microalgae as a potential functional ingredient: Evaluation of the phytochemical profile, antioxidant activity and in-vitro enzymatic inhibitory effect of different species, Molecules, http://doi.org/10.3390/molecules26247593
- Modulating process parameters to change physicalproperties of bigels for food applications, Food Structure, http://doi.org/10.1016/j.foostr.2020.100173
- Modulation and Characterization of Wax-Based Olive Oil Organogels in View of Their Application in the Food Industry, Gels, http://doi.org/10.3390/gels7010012
- Nano and Microengineered Structures for Enhanced Stability and Controlled Release of Bioactive Compounds, Delivering Functionality in Foods, http://doi.org/10.1007/978-3-030-83570-5_3
- Nano spray drying of food ingredients; materials, processing and applications, Trends in Food Science & Technology, http://doi.org/10.1016/j.tifs.2021.01.061
- Oleogel-Based Systems for the Delivery of Bioactive Compounds in Foods, Gels, http://doi.org/10.3390/gels7030086
- PHBV films loaded with FO1 bacteriophage using polyvinyl alcohol-based nanofibers and coatings: a comparative study, Innovative Food Science and Emerging Technologies, http://doi.org/10.1016/j.ifset.2021.102646
- Polymeric nanoparticles as oral delivery systems for a grape pomace extract towards the improvement of biological activities, Materials Science and Engineering C, http://doi.org/10.1016/j.msec.2020.111551
- Pseudomonas aeruginosa PAO 1 In Vitro Time–Kill Kinetics Using Single Phages and Phage Formulations—Modulating Death, Adaptation, and Resistance, Antibiotics, http://doi.org/10.3390/antibiotics10070877
- Rhamnolipids–based nanostructured lipid carriers: Effect of lipid phase on physicochemical properties and stability, Food Chemistry, http://doi.org/10.1016/j.foodchem.2020.128670
- The clinical path to deliver encapsulated phages and lysins, Microbiology Reviews, http://doi.org/10.1093/femsre/fuab019
- The Effect of Molecular Weight on the Antimicrobial Activity of Chitosan from Loligo opalescens for Food Packaging Applications, Marine Drugs, http://doi.org/10.3390/md19070384

Food Quality and Safety

- A multivalent aptamer-based electrochemical biosensor for biomarker detection in urinary tract infection, Electrochimica Acta, http://doi.org/10.1016/j.electacta.2021.138644
- Amplified plasmonic and microfluidic setup for DNA monitoring, Microchimica Acta, http://doi.org/10.1007/s00604-021-04983-y
- Application of Omics-based Miniaturized Systems in Food Quality and Safety, Foodomics: Omic Strategies and Applications in Food Science, http://doi.org/10.1039/9781839163005-00222
- Development and evaluation of a real-time fluorescence, and naked-eye colorimetric, loop-mediated isothermal amplification-based method for the rapid detection of spoilage fungi in fruit preparations, Food Control, http://doi.org/10.1016/j.foodcont.2021.108784
- Development of a real-time PCR assay with an internal amplification control for the detection of spoilage fungi in fruit preparations, Food Control, http://doi.org/10.1016/j.foodcont.2021.108783
- Dual colorimetric strategy for specific DNA detection by nicking endonuclease-assisted gold nanoparticle signal amplification, Analytical and Bioanalytical Chemistry, http://doi.org/10.1007/s00216-021-03564-5
- Evaluation of simple sequence repeats (SSR) and single nucleotide polymorphism (SNP)-based methods in olive varieties from the Northwest of Spain and potential for miniaturization, Food Chemistry: Molecular, http://doi.org/10.1016/j.fochms.2021.100038
- Faster monitoring of the invasive alien species (IAS) Dreissena polymorpha in river basins through isothermal amplification, Scientific Reports, http://doi.org/10.1038/s41598-021-89574-w
- Gold Nanoframe Array Electrode for Straightforward Detection of Hydrogen Peroxide, Chemosensors, http://doi.org/10.3390/chemosensors9020037
- Gold nanoparticle-assisted plasmonic enhancement for DNA detection on a graphene-based portable surface plasmon resonance sensor, Nanotechnology, http://doi.org/10.1088/1361-6528/abcd62
- Influence of the Electrolyte Salt Concentration on DNA Detection with Graphene Transistors, Biosensors-Basel, http://doi.org/10.3390/bios11010024
- Loop-mediated isothermal amplification combined with immunomagnetic separation and propidium monoazide for the specific detection of viable Listeria monocytogenes in milk products with an internal amplification control, Food Control, http://doi.org/10.1016/j.foodcont.2021.107975
- Microsatellite Markers in Olives (Olea europaea L.): Utility in the Cataloging of Germplasm, Food Authenticity and Traceability Studies, Foods, http://doi.org/10.3390/foods10081907
- Optimization and Clinical Evaluation of a Multi-Target Loop-Mediated Isothermal Amplification Assay for the Detection of SARS-CoV-2 in Nasopharyngeal Samples, Viruses, http://doi.org/10.3390/v13050940
- Single-use microfluidic device for purification and concentration of environmental DNA from river water. Talanta, http://doi.org/10.1016/j.talanta.2021.122109
- Suitability of the MinION long read sequencer for semi-targeted detection of foodborne pathogens, Analytica Chimica Acta, http://doi.org/10.1016/j.aca.2021.339051
- Terminal Deoxynucleotidyl Transferase-Mediated Formation of Protein Binding Polynucleotides, Nucleic Acids Research, http://doi.org/10.1093/nar/gkaa1263

Integrated Micro and Nanotechnologies

- Broadband and Omnidirectional Antireflection Surfaces Based on Deep Subwavelength Features for Harvesting of the Solar Energy, Solar RRL, http://doi.org/10.1002/solr.202100548
- CHARMIE: A Collaborative Healthcare and Home Service and Assistant Robot for Elderly Care, Applied Sciences,http://doi.org/10.3390/app11167248
- Enhanced virtual reality application with tactile feedback for prototyping in-car dashboard surfaces, IEEE World Haptics Conference (WHC), http://doi.org/10.1109/WHC49131.2021.9517204
- High precision, geometry independent analytical method for self-inductance calculation in planar coils, IEEE International Conference on Industrial Technology (ICIT 2021), http://doi.org/10.1109/ICIT46573.2021.9453559
- Plasmomechanical Systems: Principles and Applications, Advanced Functional Materials, http://doi.org/10.1002/adfm.202103706

Laboratory for Nanostructured Solar Cells

- Atomic-scale interface modification improves the performance of Cu(In1-xGax)Se2/Zn(O,S) heterojunction solar cells, ACS Applied Materials Interfaces, http://doi.org/10.1021/acsami.1c10251
- Effect of Cu-In-Ga Target Composition on Hybrid-Sputtered Cu(In,Ga)Se-2 Solar Cells, IEEE Journal of Photovoltaics, http://doi.org/10.1109/JPHOTOV.2021.3086452
- Effect of Se-Free Annealing on Cesium Fluoride-Treated Cu(In,Ga)Se2 Thin Films and Corresponding Solar Cells, Physica Status Solidi (RRL) – Rapid Research Letters, http://doi.org/10.1002/pssr.202100462
- Efficient ReSe2 Photodetectors with CVD Single-Crystal Graphene Contacts, Nanomaterials, http://doi.org/10.3390/nano11071650
- Grain boundaries in Cu(In,Ga)Se2: a review on composition-electronic property relationships by atom probe tomography and correlative microscopy, Advanced Functional Materials, http://doi.org/10.1002/adfm.202103119
- Novel Polymorph of GaSe, Advanced Functional Materials, http://doi.org/10.1002/adfm.202104965
- Role of sublimation kinetics of ammonia borane in chemical vapor deposition of uniform, large-area hexagonal boron nitride, Journal of Vacuum Science & Technology, http://doi.org/10.1116/6.0000987
- Van der Waals epitaxy of 2-dimensional -In2Se3 on insulators used in standard Silicon microelectronics technology, Crystal Growth & Design, http://doi.org/10.1021/acs.cgd.1c00599
- Wafer-Scale Fabrication of 2D beta-In2Se3 Photodetectors, Advanced Optical Materials, doi.org/10.1002/adom.202001034

Medical Devices

- Atmospheric Photoionization Detector with Improved Photon Efficiency: A Proof of Concept for Application of a Nanolayer Thin-Film Electrode, Sensors, http://doi.org/10.3390/s21227738
- Correlative atomic force microscopy, Imaging Modalities for Biological and Preclinical Research: A Compendium, Volume 2, http://doi.org/10.1088/978-0-7503-3747-2ch17
- Electrochemical Sensing in 3D Cell Culture Models: New Tools for Developing Better Cancer Diagnostics and Treatments, Cancers, http://doi.org/10.3390/cancers13061381
- Enhanced virtual reality application with tactile feedback for prototyping in-car dashboard surfaces 2021, IEEE World Haptics Conference (WHC), http://doi.org/10.1109/WHC49131.2021.9517204
- Fluorescence cross-correlation spectroscopy as a valuable tool to characterize cationic liposome-DNA nanoparticle assembly, Journal of Biophotonics, http://doi.org/10.1002/jbio.202170001
- HER2 Expression in Circulating Tumour Cells Isolated from Metastatic Breast Cancer Patients Using a Size-Based Microfluidic Device, Cancers, http://doi.org/10.3390/cancers13174446
- How did correlative atomic force microscopy and super-resolution microscopy evolve in the quest for unravelling enigmas in biology?, Nanoscale, http://doi.org/1039/d0nr07203f
- How did correlative atomic force microscopy and super-resolution microscopy evolve in the quest for unravelling enigmas in biology?, Nanoscale, http://doi.org/10.1039/D1NR90021H

- Multiplexing Liquid Biopsy with Surface-Enhanced Raman Scattering Spectroscopy, Advanced Optical Materials, http://doi.org/10.1002/adom.202001171
- Performance assessment of 11 commercial serological tests for SARS-CoV-2 on hospitalised COVID-19 patients, International Journal of Interanational Diseases, http://doi.org/10.1016/j.ijid.2021.01.038
- Single-use microfluidic device for purification and concentration of environmental DNA from river water, Talanta, http://doi.org/10.1016/j.talanta.2021.122109
- Subcompartmentalization and PseudoDivision of Model Protocells, Small, http://doi.org/10.1002/smll.202005320
- Target Score-A Proteomics Data Selection Tool Applied to Esophageal Cancer Identifies GLUT1-Sialyl Tn Glycoforms as Biomarkers of Cancer Aggressiveness, International Journal of Molecular Sciences, http://doi.org/10.3390/ijms22041664
- Use of some cost-effective technologies for a routine clinical pathology laboratory, Lab on a Chip, http://doi.org/10.1039/d1lc00658d

Nanochemistry

- Acute ecotoxicity assessment of a covalent organic framework, Environmental Science-Nano, http://doi.org/10.1039/d0en01059f
- Boronic-acid-derived covalent organic frameworks: from synthesis to applications, New Journal of Chemistry, http://doi.org/10.1039/d1nj01269j
- Compositional Fluctuations Mediated by Excess Tellurium in Bismuth Antimony Telluride Nanocomposites Yield High Thermoelectric Performance, The Journal of Physical Chemistry A, http://doi.org/10.1021/acs.jpcc.1c05375
- Covalent organic framework as adsorbent for ultrasound-assisted dispersive (micro)solid phase extraction of polycyclic synthetic fragrances from seawater followed by fluorescent determination, Analytica Chimica Acta, http://doi.org/10.1016/j.aca.2021.339293
- Critical Review of Platinum Group Metal-Free Materials for Water Electrolysis: Transition from the Laboratory to the Market: Earth-abundant borides and phosphides as catalysts for sustainable hydrogen production, Johnson Matthey Technology Review, http://doi.org/10.1595/205651321X16067419458185
- Eco-friendly and cost-efficient inks for screen-printed fabrication of copper indium gallium diselenide photoabsorber thin films, Journal of Colloid and Interface Science, http://doi.org/10.1016/j.jcis.2021.04.059
- Electrocatalysis using nanomaterials, Nanoscale Electrochemistry, Frontiers of Nanoscience, http://doi.org/10.1016/B978-0-12-820055-1.00002-2
- Large-scale aqueous synthesis of Cu(In,Ga)Se-2 nanoparticles for photocatalytic degradation of ciprofloxacin, Falton Transactions, http://doi.org/10.1039/d1dt03557f
- New Functionalized Macroparticles for Environmentally Sustainable Biofilm Control in Water System, Antibiotics, http://doi.org/10.3390/antibiotics10040399
- New Opportunity for Carbon-Supported Ni-based Electrocatalysts: Gas-Phase CO2 Methanation, ChenCatChem, http://doi.org/10.1002/cctc.202101284
- New Opportunity for Carbon-Supported Ni-based Electrocatalysts:Gas-Phase CO2 Methanation, ChemCatChem, http://doi.org/10.1002/cctc.202101284
- PEGylated perylene bisimides: Chromonic building blocks for the aqueous synthesis of nanostructured silica materials, Journal of Molecular Liquids, http://doi.org/10.1016/j.molliq.2020.114657
- Photocatalytic-Fenton Process under Simulated Solar Radiation Promoted by a Suitable Catalyst Selection, Catalysts, http://doi.org/10.3390/catal11080885
- Selection of Covalent Organic Framework Pore Functionalities for Differential Adsorption of Microcystin Toxin Analogues, ACS Applied Materials & Interfaces, http://doi.org/10.1021/acsami.0c18808

- Silane-based coating charged with TiO2 NPs for dental implant applications, Surface and Coatings Technology, http://doi.org/10.1016/j.surfcoat.2021.127066
- Study on the efficiency of a covalent organic framework as adsorbent for the screening of pharmaceuticals in estuary waters, Chemosphere, http://doi.org/10.1016/j.chemosphere.2021.130364
- Study on the efficiency of a covalent organic framework as adsorbent for the screening of pharmaceuticals in estuary waters, Chemosphere, http://doi.org/10.1016/j.chemosphere.2021.130364
- Sustainable catalysts for water electrolysis: Selected strategies for reduction and replacement of platinum-group metals, Materials Today Sustainability, http://doi.org/10.1016/j.mtsust.2021.100060

Nanodevices

- Cationic Lipid-Based Formulations for Encapsulation and Delivery of Anti-EFG1 2'OMethylRNA Oligomer, Research Square, doi.org/10.21203/rs.3.rs-1004349/v1
- Electrical characterisation of higher order spin wave modes in vortex-based magnetic tunnel junctions, Communications Physics, http://doi.org/10.1038/s42005-021-00614-3
- Establishment of Colorectal Cancer Organoids in Microfluidic-Based System, Micromachines, http://doi.org/10.3390/mi12050497
- Fluorescence cross-correlation spectroscopy as a valuable tool to characterize cationic liposome-DNA nanoparticle assembly, Journal of Biophotonics, http://doi.org/10.1002/jbio.202170001
- Gold Nanoframe Array Electrode for Straightforward Detection of Hydrogen Peroxide, Chemosensors, http://doi.org/10.3390/chemosensors9020037
- Gold nanoparticle-assisted plasmonic enhancement for DNA detection on a graphene-based portable surface plasmon resonance sensor, Nanotechnology, http://doi.org/10.1088/1361-6528/abcd62
- Influence of the media ionic strength on the formation and in vitro biological performance of polycation-DNA complexes, Journal of Molecular Liquids, http://doi.org/10.1016/j.molliq.2021.117930
- Non-volatile artificial synapse based on a vortex nano-oscillator, Scientific Reports, http://doi.org/10.1038/s41598-021-95569-4
- Optical specifications for a proximal sensing approach to monitor the vine water status in a distributed and autonomous fashion, Biosystems Engineering, http://doi.org/10.1016/j.biosystemseng.2021.11.007
- Phase variation in the locked state of mutually synchronized spin torque nano-oscillators, Applied Physics Letters, http://doi.org/10.1063/5.0046038
- Room temperature two terminal tunnel magnetoresistance in a lateral graphene transistor, Nanoscale, http://doi.org/10.1039/d1nr05495c
- Sustained Release of a Streptococcus pneumoniae Endolysin from Liposomes for Potential Otitis Media Treatment, ACS Infectious Diseases, http://doi.org/10.1021/acsinfecdis.1c00108
- The Challenges of Developing Biosensors for Clinical Assessment: A Review, Chemosensors, http://doi.org/10.3390/chemosensors9110299

Nanofabrication for optoelectronic applications

- Acute ecotoxicity assessment of a covalent organic framework, Environmental Science-Nano, http://doi.org/10.1039/d0en01059f
- Boronic-acid-derived covalent organic frameworks: from synthesis to applications, New Journal of Chemistry, http://doi.org/10.1039/d1nj01269j
- Compositional Fluctuations Mediated by Excess Tellurium in Bismuth Antimony Telluride Nanocomposites Yield High Thermoelectric Performance, The Journal of Physical Chemistry A, http://doi.org/10.1021/acs.jpcc.1c05375
- Covalent organic framework as adsorbent for ultrasound-assisted dispersive (micro)solid phase extraction of polycyclic synthetic fragrances from seawater followed by fluorescent determination, Analytica Chimica Acta, http://doi.org/10.1016/j.aca.2021.339293
- Critical Review of Platinum Group Metal-Free Materials for Water Electrolysis: Transition from the Laboratory to the Market: Earth-abundant borides and phosphides as catalysts for sustainable hydrogen production, Johnson Matthey Technology Review, http://doi.org/10.1595/205651321X16067419458185
- Eco-friendly and cost-efficient inks for screen-printed fabrication of copper indium gallium diselenide photoabsorber thin films, Journal of Colloid and Interface Science, http://doi.org/10.1016/j.jcis.2021.04.059

- Interfaces, http://doi.org/10.1002/admi.202101004
- SiOx patterned based substrates implemented in Cu(In,Ga)Se-2 ultrathin solar cells: optimum thickness, IEEE 48th Photovoltaic Specialists Conference (PVSC), http://doi.org/10.1109/PVSC43889.2021.9518516
- X-ray Photoelectron Spectroscopy for Studying Passivation Architectures of Cu(In,Ga)Se-2 Cells, IEEE 48th Photovoltaic Specialists Conference (PVSC), http://doi.org/10.1109/PVSC43889.2021.9518673

Nanomaterials for Energy Storage and Conversion

- Amorphous phosphatized ruthenium-iron bimetallic nanoclusters with Pt-like activity for hydrogen evolution reaction, Applied Catalysis B – Environmental, http://doi.org/10.1016/j.apcatb.2020.119583
- Atomic-Step Enriched Ruthenium-Iridium Nanocrystals Anchored Homogeneously on MOF-Derived Support for Efficient and Stable Oxygen Evolution in Acidic and Neutral Media, ACS Catalysis, http://doi.org/10.1021/acscatal.0c04117
- Dual-phase CoP-CoTe2 nanowires as an efficient bifunctional electrocatalyst for bipolar membrane-assisted acid-alkaline water splitting, Chemical Engineering Journal, http://doi.org/10.1016/j.cej.2021.130454
- Easy preparation of multifunctional ternary PdNiP/C catalysts toward enhanced small organic molecule electro-oxidation and hydrogen evolution reactions, Journal of Energy Chemistry, http://doi.org/10.1016/j.jechem.2020.10.016
- Efficient hydrogen production by saline water electrolysis at high current densities without the interfering chlorine evolution, Journal of Materials Chemistry A, http://doi.org/10.1039/d1ta05703k
- Exceptional lithium storage performance achieved by iron-based nanostructures upon extended high-rate cycling, Journal of Alloys and Compounds, http://doi.org/10.1016/j.jallcom.2021.161626
- Light-driven oxygen evolution from water oxidation with immobilised TiO2 engineered for high performance, Scientific Reports, http://doi.org/10.1038/s41598-021-99841-5
- Lithium-copper alloy embedded in 3D porous copper foam with enhanced electrochemical performance toward lithium metal batteries, Materials Today Energy, http://doi.org/10.1016/j.mtener.2021.10087
- Multifunctional Noble Metal Phosphide Electrocatalysts for Organic Molecule Electro-Oxidation, ACS Applied Energy Materials, http://doi.org/10.1021/acsaem.0c02803
- Novel Quasi-Liquid K-Na Alloy as a Promising Dendrite-Free Anode for Rechargeable Potassium Metal Batteries, Advanced Science, http://doi.org/10.1002/advs.202101866
- Plasma tailoring in WTe2 nanosheets for efficiently boosting hydrogen evolution reaction" Journal of Materials Science and Technology, http://doi.org/10.1016/j.jmst.2020.10.070
- Platinum group metal free nano-catalysts for proton exchange membrane water electrolysis, Current Opinion in Chemical Engineering, http://doi.org/10.1016/j.coche.2021.100743
- Rhodium single-atom catalysts with enhanced electrocatalytic hydrogen evolution performance, New Journal of Chemistry, http://doi.org/10.1039/d1nj00210d

Nanomedicine

- A novel amino phosphonate-coated magnetic nanoparticle as MRI contrast agent, Applied Surface Science, http://doi.org/10.1016/j.apsusc.2020.148824
- A novel and extremely stable nanofluid based on iron oxide nanoparticles: Experimental investigations on the thermal performance, Thermal Science and Engineering Progress, http://doi.org/10.1016/j.tsep.2021.101085
- Challenges and recommendations for magnetic hyperthermia characterization measurements, International Journal of Hyperthermia, http://doi.org/10.1080/02656736.2021.1892837.
- Combining Experimental Data with Statistical Methods to Evaluate Hydrolyzed Reactive Dye Removal by alpha-Fe2O3 in a Cellulose-Based Membrane, Fibers, http://doi.org/10.3390/fib9100061
- Effective production of multifunctional magnetic-sensitive biomaterial by an extrusion-based additive manufacturing technique, Biomedical Materials, http://doi.org/10.1088/1748-605X/abac4c
- Experimental Studies of the Sedimentation, Stability and Thermal Conductivity of Two Different Nanofluids, Engineering Proceedings, http://doi.org/10.3390/Micromachines2021-09589
- Extrinsic room-temperature ferromagnetism in MoS2, Journal of Material Science, http://doi.org/10.1007/s10853-021-05916-z
- G-Quadruplex DNA as a Target in Pathogenic Bacteria: Efficacy of an Extended Naphthalene Diimide Ligand and Its Mode of Action, Journal of Medicinal Chemistry, http://doi.org/10.1021/acs.jmedchem.1c01905
- Graphene-Based Magnetic Nanoparticles for Theranostics: An Overview for Their Potential in Clinical Application, Nanomaterials, http://doi.org/10.3390/nano11051073
- Magnetic Field Mapping Around Individual Magnetic Nanoparticle Agglomerates Using Nitrogen-Vacancy Centers in Diamond, Particle&Particle, http://doi.org/10.1002/ppsc.202100011
- Magnetoliposomes Based on Shape Anisotropic Calcium/Magnesium Ferrite Nanoparticles as Nanocarriers for Doxorubicin, Pharmaceutics, http://doi.org/10.3390/pharmaceutics13081248
- PHBV films loaded with FO1 bacteriophage using polyvinyl alcohol-based nanofibers and coatings: a comparative study, Innovative Food Science and Emerging Technologies, http://doi.org/10.1016/j.ifset.2021.102646
- Potential G-quadruplexes and i-Motifs in the SARS-CoV-2, PLOS One, http://doi.org/10.1371/journal.pone.0250654
- Pseudomonas aeruginosa PAO 1 In Vitro Time–Kill Kinetics Using Single Phages and Phage Formulations—Modulating Death, Adaptation, and Resistance, Antibiotics, http://doi.org/10.3390/antibiotics10070877
- Ratiometric magnetic resonance imaging: Contrast agent design towards better specificity and quantification, Coordination Chemistry Reviews, http://doi.org/10.1016/j.ccr.2021.214150
- Smart magnetic resonance imaging-based theranostics for cancer, Theranostics, http://doi.org/10.7150/thno.57004
- Solid Lipid Particles for Lung Metastasis Treatment, Pharmaceutics, http://doi.org/10.3390/pharmaceutics13010093
- Stimulation and Suppression of the Innate Immune System through Nanotechnology, ACS Applied Nano Materials, http://doi.org/10.1021/acsanm.0c03424
- Sustained Release of a Streptococcus pneumoniae Endolysin from Liposomes for Potential Otitis Media Treatment, ACS Infectious Diseases, http://doi.org/10.1021/acsinfecdis.1c00108
- Targeting Nanomaterials to Head and Neck Cancer Cells Using a Fragment of the Shiga Toxin as a Potent Natural Ligand, Cancers, http://doi.org/10.3390/cancers13194920
- The clinical path to deliver encapsulated phages and lysins, FEMS Microbiology Reviews, http://doi.org/10.1093/femsre/fuab019
- Xanthan-Fe3O4 Nanoparticle Composite Hydrogels for Non-Invasive Magnetic Resonance Imaging and Magnetically Assisted Drug Delivery, ACS Apploed Nano Materials, http://doi.org/10.1021/acsanm.1c00932

Nanostructured Materials

- Atomic-Scale Interface Modification Improves the Performance of Cu(In1-xGax)Se-2/Zn(O,S) Heterojunction Solar Cells, ACS Applied Materials & Interfaces, http://doi.org/10.1021/acsami.1c10251
- Boron Doped Ni-Rich LiNi0.85Co0.10Mn0.05O2 Cathode Materials: Uniqueness of a Small-Size Dopant Studied by Structural Analysis, Computational Modeling, Electrochemical Performance, and Monitoring 6Li and 11B in Cycled Electrodes, Energy Storage Materials, http://doi.org/10.1016/j.ensm.2021.08.005
- Engineering Surface Electron and Active Site at Electrochemical Sensing Interface of CN Vacancy-Mediated Prussian Blue Analogue for Analysis of Heavy Metal Ions, Applied Surface Science, http://doi.org/10.1016/j.apsusc.2021.150131
- Enhancing Light-Matter Interactions in MoS2 by Copper Intercalation, Advanced Materials, http://doi.org/10.1002/adma.202008779
- Extrinsic room-temperature ferromagnetism in MoS2, Journal of Material Science, http://doi.org/10.1007/s10853-021-05916-z
- Functionalized magnetic composite nano/microfibres with highly oriented van der Waals CrI3 inclusions by electrospinning, Nanotechnology, http://doi.org/10.1088/1361-6528/abd4a3
- Morphology-Tunable Synthesis of Intrinsic Room-Temperature Ferromagnetic -Fe2O3 Nanoflakes, ACS Applied Materials & Interfaces, http://doi.org/10.1021/acsami.1c05342
- Sustainable Existence of Solid Mercury (Hg) Nanoparticles at Room Temperature and Their Applications, Chemical Science, http://doi.org/10.1039/D2SC02297D

Natural and Artificial Photonic Structures and Devices

- Bio-based optical and photonic materials: towards nature-based production methods for photonics, Photoniques, http://doi.org/10.1051/photon/202111036

Quantum and Linear-Optical Computation

- The logic of contextuality, Leibniz International Proceedings in Informatics (LIPIcs), http://doi.org/10.4230/LIPIcs.CSL.2021.5
- Witnesses of coherence and dimension from multiphoton indistinguishability test, Physical Review Research, http://doi.org/10.1103/PhysRevResearch.3.023031
- Gaussian optical networks for one-dimensional anyons, Physical Review A, http://doi.org/10.1103/PhysRevA.104.022604
- Learning models of quantum systems from experiments, Nature Physics, http://doi.org/10.1038/s41567-021-01201-7
- Scheme for Universal High-Dimensional Quantum Computation with Linear Optics, Physical Review Letters, http://doi.org/10.1103/PhysRevLett.126.230504
- Emergence of Noncontextuality under Quantum Darwinism, PRX Quantum, http://doi.org/10.1103/PRXQuantum.2.030351
- Compiling quantamorphisms for the IBM Q Experience, IEEE Transactions on Software Engineering. http://doi.org/10.1109/TSE.2021.3117515

Quantum Software Engineering

- Compiling quantamorphisms for the IBM Q Experience, IEEE Transactions on Software Engineering, http://doi.ieeecomputersociety.org/10.1109/TSE.2021.3117515
- Generalised Quantum Tree Search, IEEE Explore, http://doi.org/10.1109/Q-SE52541.2021.00015
- Quantum Bayesian decision-making, Foundations of Science, doi.org/10.1007/s10699-021-09781-6
- Quantum Tree-Based Planning, IEEE Access, http://doi.org/10.1109/ACCESS.2021.3110652

Spintronics

- Analog and Digital Phase Modulation and Signal Transmission with Spin-Torque Nano-Oscillators, Physical Review Applied, http://doi.org/10.1103/PhysRevApplied.16.024048
- Beyond the gyrotropic motion: Dynamic C-state in vortex spin torque oscillators, Applied Physics Letters, http://doi.org/10.1063/5.0029083
- Electrical characterisation of higher order spin wave modes in vortex-based magnetic tunnel junctions, Communications Phycis, http://doi.org/10.1038/s42005-021-00614-3
- Flicker and random telegraph noise between gyrotropic and dynamic C-state of a vortex based spin torque nano oscillator, AIP Advances, http://doi.org/10.1063/9.0000197
- Hardware realization of the multiply and accumulate operation on radio-frequency signals with magnetic tunnel junctions, Neuromorphic Computing and Engineering, http://doi.org/10.1088/2634-4386/abfca6
- Magnetoresistive Sensors and Piezoresistive Accelerometers for Vibration Measurements: A Comparative Study, Journal of Sensor and Actuator Networks, http://doi.org/10.3390/jsan10010022
- Non-volatile artificial synapse based on a vortex nano-oscillator, Scientific Reports, http://doi.org/10.1038/s41598-021-95569-4
- Phase variation in the locked state of mutually synchronized spin torque nano-oscillators, Applied Physic Letters, http://doi.org/10.1063/5.0046038
- Room temperature two terminal tunnel magnetoresistance in a lateral graphene transistor, Nanoscale, http://doi.org/10.1039/d1nr05495c

Theory of Quantum Nanostructures

- Electronic and magnetic properties of VOCl/FeOCl antiferromagnetic heterobilayers, 2D Materials, http://doi.org/10.1088/2053-1583/ac152d
- Extrinsic room-temperature ferromagnetism in MoS2, Journal of Material Science, http://doi.org/10.1007/s10853-021-05916-z
- Gutzwiller wave function on a digital quantum computer, Physical Review B, http://doi.org/10.1103/PhysRevB.103.L241113
- Large magnetic exchange coupling in rhombus-shaped nanographenes with zigzag periphery, Nature Chemistry, http://doi.org/10.1038/s41557-021-00678-2
- Observation of fractional edge excitations in nanographene spin chains, Nature, http://doi.org/10.1038/s41586-021-03842-3
- Quantum-coherent nanoscience, Nature Nanotechnology, http://doi.org/10.1038/s41565-021-00994-1
- Renormalization of spin excitations and Kondo effect in open-shell nanographenes, Physical Review B, http://doi.org/10.1103/PhysRevB.104.075404
- Testing complementarity on a transmon quantum processor, Physical Review A, http://doi.org/10.1103/PhysRevA.104.032223

Ultrafast bio- and Nanophotonics

- All-Dielectric Synthetic-Phase Metasurfaces Generating Practical Airy Beams, ACS Nano, http://doi.org/10.1021/acsnano.0c07770
- Cityscape LoRa Signal Propagation Predicted and Tested Using Real-World Building-Data Based O-FDTD Simulations and Experimental Characterization, Sensors, http://doi.org/10.3390/s21082717
- Lipid Nanosystems and Serum Protein as Biomimetic Interfaces: Predicting the Biodistribution of a Caffeic Acid-Based Antioxidant, Nanotechnology Science and Applications, http://doi.org/10.2147/NSA.S289355
- Magnetic Field Mapping Around Individual Magnetic Nanoparticle Agglomerates Using Nitrogen-Vacancy Centers in Diamond, Particle & Particle, http://doi.org/10.1002/ppsc.202100011
- Oscillator Finite-Difference Time-Domain (O-FDTD) electric field propagation model: integrated photonics and networks, EPJ Web of Conferences, http://doi.org/10.1051/epjconf/202125501005
- Photonic polymeric structures and electrodynamics simulation method based on a coupled oscillator finite-difference time-domain (O-FDTD) approach, Optics Express, http://doi.org/10.1364/OE.414211
- Subwavelength neuromorphic nanophotonic integrated circuits for spike-based computing: challenges and prospects, Proceedings SPIE 11804, http://doi.org/10.1117/12.2591852

Water Quality

- A novel microfluidic system for the sensitive and cost-effective detection of okadaic acid in mussels, Analyst, http://doi.org/10.1039/d0an02092c
- A novel microfluidic system for the sensitive and cost-effective detection of okadaic acid in mussels, Analyst, http://doi.org/10.1039/d1an90100a
- Acute ecotoxicity assessment of a covalent organic framework, Environmental Science-Nano, http://doi.org/1010.1039/d0en01059f
- Additional Commentary on the Detection and Quantification of Plastic Micro- and Nanoparticles in Tea Samples, CHIMIA International Journal for Chemistry, http://doi.org/10.2533/chimia.2021.882
- Covalent organic framework as adsorbent for ultrasound-assisted dispersive (micro)solid phase extraction of polycyclic synthetic fragrances from seawater followed by fluorescent determination, Analytica Chimica Acta, http://doi.org/10.1016/j.aca.2021.339293
- Detection of Silver Nanoparticles in Seawater Using Surface-Enhanced Raman Scattering, Nanomaterials, http://doi.org/10.3390/nano11071711
- Impurities in polyvinylpyrrolidone: the key factor in the synthesis of gold nanostars, Nanoscale Advances, http://doi.org/10.1039/d1na00711d
- Plastics in our ocean as transdisciplinary challenge, Marine Pollution Bulletin, http://doi.org/10.1016/j.marpolbul.2021.112051

- Selection of Covalent Organic Framework Pore Functionalities for Differential Adsorption of Microcystin Toxin Analogues, ACS Applied Materials & Interfaces, http://doi.org/1010.1021/acsami.0c18808
- Study on the efficiency of a covalent organic framework as adsorbent for the screening of pharmaceuticals in estuary waters, Chemosphere, http://doi.org/10.1016/j.chemosphere.2021.130364
- The Choice of Nanoparticle Surface-Coupled Fluorescent Dyes Impacts Cellular Interaction, ChemNanoMat, http://doi.org/10.1002/cnma.202100443

2D Materials and devices

- Discovering Light: Fun Experiments with Optics, SPIE e-book, http://doi.org/10.1117/3.2579764
- Efficient infrared sunlight absorbers based on gold-covered, inverted silicon pyramid arrays, Materials Advances, http://doi.org/10.1039/D1MA01237A
- Efficient ReSe2 Photodetectors with CVD Single-Crystal Graphene Contacts, Nanomaterials, http://doi.org/10.3390/nano11071650
- Environmentally Friendly Graphene Inks for Touch Screen Sensors, Advanced Functional Materials, http://doi.org/10.1002/adfm.202103287
- HER2 Expression in Circulating Tumour Cells Isolated from Metastatic Breast Cancer Patients Using a Size-Based Microfluidic Device, Cancers, http://doi.org/10.3390/cancers13174446
- High-Performance and Industrially Viable Nanostructured SiOx Layers for Interface Passivation in Thin Film Solar Cells, Solar RRL, http://doi.org/10.1002/solr.202000534
- Hydrogenated Graphene Improves Neuronal Network Maturation and Excitatory Transmission, Advanced Biology, http://doi.org/10.1002/adbi.202000177
- Influence of the Electrolyte Salt Concentration on DNA Detection with Graphene Transistors, Biosensors-Basel, http://doi.org/10.3390/bios11010024
- Interactions Between 2D Materials and Living Matter: A Review on Graphene and Hexagonal Boron Nitride Coatings, Frontiers in Bioengineering and Biotechnology, http://doi.org/10.3389/fbioe.2021.612669
- Interactions between Primary Neurons and Graphene Films with Different Structure and Electrical Conductivity, Advanced Functional Materials, http://doi.org/10.1002/adfm.202005300
- Non-volatile artificial synapse based on a vortex nano-oscillator, Scientific Reports, http://doi.org/10.1038/s41598-021-95569-4
- On the Importance of Joint Mitigation Strategies for Front, Bulk, and Rear Recombination in Ultrathin Cu(In,Ga)Se-2 Solar Cells, ACS Applied Materials & Interfaces, http://doi.org/10.1021/acsami.1c07943
- Role of sublimation kinetics of ammonia borane in chemical vapor deposition of uniform, large-area hexagonal boron nitride, Journal of Vaccum Science & Technology, http://doi.org/10.1116/6.0000987
- Room temperature two terminal tunnel magnetoresistance in a lateral graphene transistor, Nanoscale, http://doi.org/10.1039/d1nr05495c
- Seedless Cu Electroplating on Co-W Thin Films in Low pH Electrolyte: Early Stages of Formation, Nanomaterials, http://doi.org/10.3390/nano11081914
- Tuning the Electronic Properties of Graphane via Hydroxylation: An Ab Initio Study, Journal of Physical Chemistry C, http://doi.org/10.1021/acs.jpcc.1c04397

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