CFM

Materialen Fisika Zentroa
Centro de Física de Materiales
Materials Physics Center

ACTIVITY REPORT

2025

CSIC
Consejo Superior de Investigaciones Científicas

EHU

MPC-BERC
Materials Physics Center
Basque Excellence Research Centre

ACTIVITY REPORT
2025

CFM

CENTRO DE FÍSICA DE MATERIALES
MATERIALEN FISIKA ZENTROA
MATERIALS PHYSICS CENTER

CSIC
Consejo Superior de Investigaciones Científicas

EHU

MPC-BERC
Materials Physics Center
Basic Excellence Research Centre

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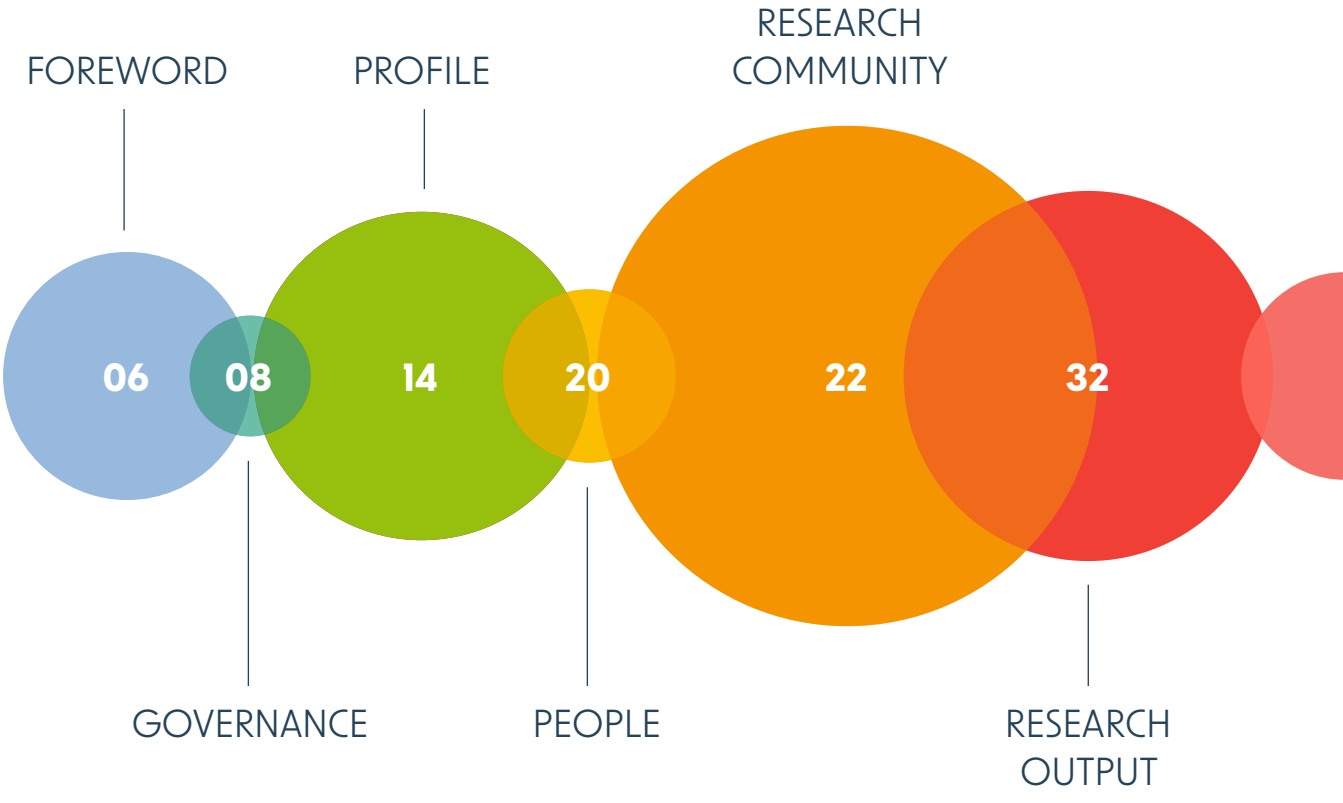
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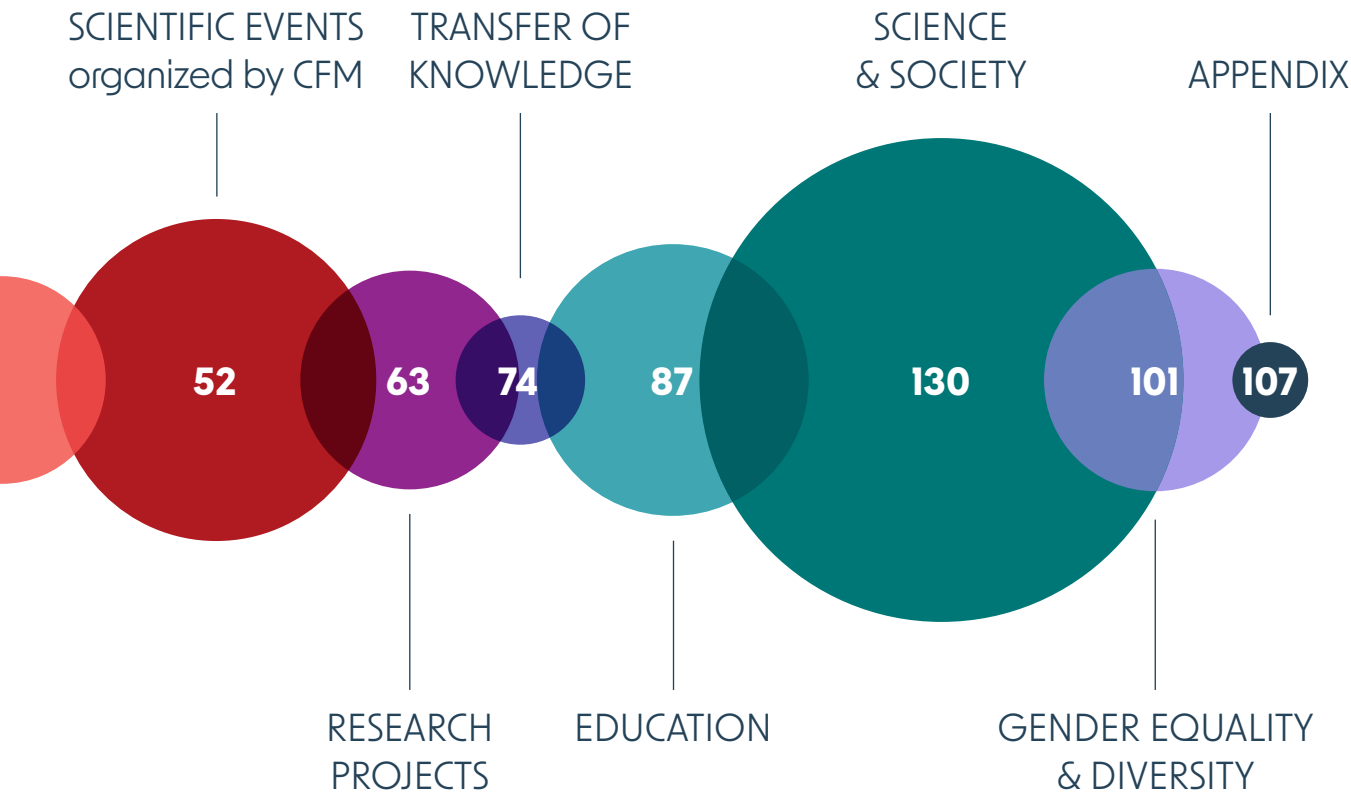
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FOREWORD

The year 2025 has been one of consolidation, excellence, and growing impact for CFM. Building on the foundations laid in recent years, the centre continues to strengthen its position as an international reference in materials science, combining outstanding fundamental research with an increasing capacity to generate societal and technological value. This progress has been made possible thanks to the continued support of the Basque Government, CSIC, and the University of the Basque Country (EHU).

One of the most significant milestones of the year has been the awarding of the Aspira MaX Sagrario Martínez Carrera Seal of Excellence. This distinction not only recognises the scientific excellence of CFM, but also provides additional resources to implement a long-term strategy. It represents a key step forward in reinforcing the centre's leadership and positions us to take on new and ambitious challenges.

This excellence is reflected in the scientific output of the centre. In 2025, CFM achieved a record number of publications, including landmark contributions published in Nature and Science. Importantly, this growth has been accompanied by a sustained commitment to quality, with most of our publications appearing in Q1 journals and more than half of them in D1 journals.

At the same time, CFM has demonstrated that the fundamental research carried out at the centre can be transformed into tangible societal impact. The creation of Photokrete S.L., a spin-off emerging from collaborative efforts between CFM, CSIC, UPNA, and EHU, exemplifies this vision. This new company brings cutting edge research closer to industrial application, highlighting the innovative potential within our community.

Direction team:
Celia Rogero (Director, middle),
Ion Errea (Vicedirector, left),
and Silvina Cerveny
(Vicedirector, right)

Beyond these milestones, the centre maintains strong and growing activity across all dimensions. CFM hosts a broad portfolio of competitive research projects and maintains a significant presence in major European programs such as MSCA, ERC, and EIC. Our research community, bringing together researchers from Ikerbasque, CSIC, and EHU, continues to grow in talent and diversity in a sustainable manner.

Scientific excellence is complemented by a vibrant environment of training, collaboration, and outreach. In 2025, we organised numerous scientific events and outreach activities, reaching more than 17,000 participants, while continuing to strengthen our knowledge transfer through patents, collaborations, and new initiatives.

Altogether, these achievements reflect a centre that, while relatively compact in size, operates with remarkable efficiency and impact. Driven by scientific curiosity, CFM pursues fundamental research on materials not as an end in itself, but as a way to understand the behaviour of matter and uncover the phenomena that will underpin future technologies and sustainable solutions.

None of this would be possible without the dedication, creativity, and commitment of everyone at CFM, including scientific staff at all career stages, from PhD students to principal investigators, as well as administrative personnel. We warmly thank all members of the community for their contributions, which make this centre a place where science is pursued with rigour, ambition, and a shared sense of purpose.

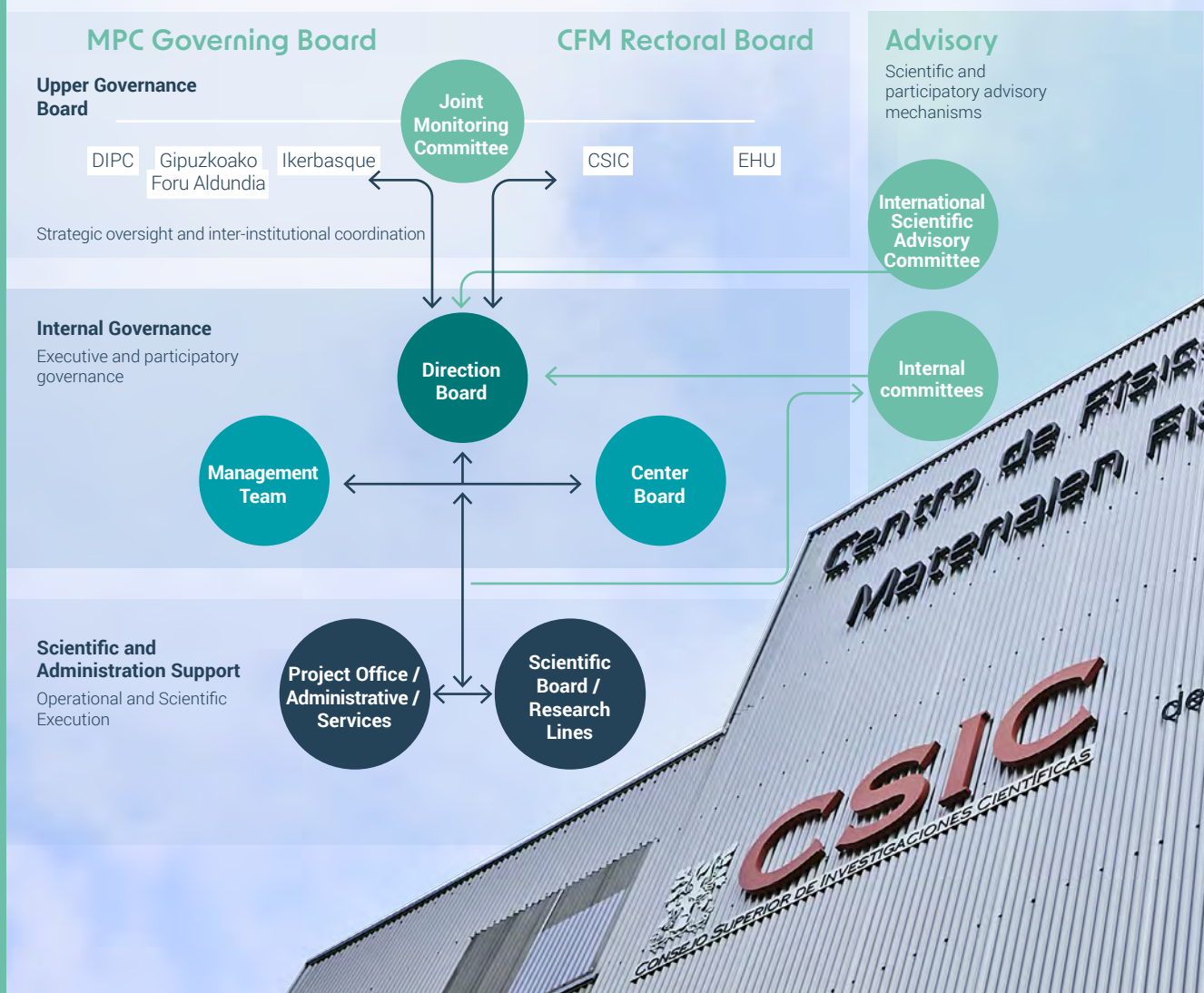
GOVERNANCE

The Materials Physics Centre operates as a unified research initiative supported by two institutional pillars: the Asociación de Investigación MPC–Materials Physics Centre (MPC) and the *Centro de Física de Materiales* (CFM). Although legally distinct, MPC and CFM function as a **single, fully integrated centre**, sharing infrastructure, scientific objectives, and strategic direction through close and permanent coordination.

The Asociación de Investigación MPC–Materials Physics Centre (MPC) is a non-profit entity and the holder and manager of the MPC-BERC grant. Its Governing Board includes representatives from Ikerbasque (Basque Foundation for Science), the Gipuzkoa Provincial Council, and the Donostia International Physics Centre (DIPC), who jointly oversee the implementation of our strategic plan and appoint the Scientific Director of the MPC Association. The Centro de Física de Materiales (CFM), in turn, is a joint research institute of the Spanish National Research Council (CSIC) and the University of the Basque Country (EHU), governed through a Rectoral Board with representatives from both institutions.

The collaboration between MPC and CFM is formally regulated by a cooperation agreement that defines the framework for joint scientific activities, the shared use of infrastructure and the coordinated management of research and institutional actions under the umbrella of the Materials Physics Centre. This structural cooperation is supervised by a joint monitoring committee.

To guarantee coherence and continuity in scientific leadership, the same individual serves as Director of both MPC and CFM. This unified governance model enables seamless integration of strategy and daily activity across both institutional structures, reinforcing the Centre's capacity to operate as a cohesive and internationally competitive research institution.



The Scientific Board, the new internal committees, and the International Scientific Advisory Committee serve as consultative bodies for the entire center—CFM and MPC as a whole—providing independent guidance and supporting strategic scientific planning across all areas of activity.

CFM RECTORAL BOARD

- **Carlos Closa Montero**, Vice-President for Organisation and Institutional Relations, CSIC
- **Antonio Chica Lara**, Coordinator of the Global Area of Materials Science, CSIC
- **Jon Iñaki Umerez Urrezola**, Vice-Rector for Research, University of the Basque Country (EHU)
- **Gotzone Barandika Argoitia**, Vice-Rector for Knowledge Transfer and Internationalisation, University of the Basque Country (EHU)

MPC GOVERNING BOARD

President: Pedro Miguel Echenique Landiribar (President of the Donostia International Physics Centre, DIPC)

Secretary: Adolfo Morais Ezquerro (Vice-Minister for Universities and Research, Basque Government), as representative of Ikerbasque – the Basque Foundation for Science

Member: Jon Gurrutxaga Mongelos (Director of Innovation, Gipuzkoa Provincial Council)

DIRECTION BOARD

Scientific Director: Celia Rogero Blanco

Deputy Directors: Ion Errea Lope, and Silvina Cerveny Murcia

CENTER BOARD

Director: Celia Rogero Blanco

Vicedirectors: Ion Errea Lope, and Silvina Cerveny Murcia

Secretary: Amaia González Azpeitia

Members: Maite Alducin Ochoa, Rubén Esteban Llorente, Armando Maestro Martín, Jorge Sánchez Dolado, Lucia Vitaly, Iñigo Aldazabal Mensa, and Ivan Sasselli Ramos

International Advisory Committee (ISAC)

In 2025, CFM-MPC renewed its External Scientific Advisory Committee, concluding the term of the committee established in 2016. Over the past eight years, the outgoing committee—comprising Professors Peter Saalfrank, Antonio Hernando Grande, Francisco J. García Vidal, and Dieter Richter—has played a pivotal role in guiding the strategic development of CFM-MPC. Their independent insights and constructive feedback have been instrumental in consolidating our scientific focus and enhancing our international visibility. We extend our deepest gratitude for their commitment, rigor, and valuable contributions throughout these years.

The appointed committee, brings together a distinguished group of scientists with deep expertise in materials physics and a broad international perspective. Their appointment marks the beginning of a new cycle of strategic reflection and scientific growth for CFM-MPC. We look forward to working closely with them to continue building a vibrant, competitive, and forward-looking research environment.

Pablo Ordejón Rontomé

CSIC Research Professor, Group Leader and Director of ICN2, Barcelona

Prof. Pablo Ordejón is a physicist specializing in electronic structure calculations and nanoscale simulations. He earned his PhD from Universidad Autónoma de Madrid and held research positions in the U.S. and Spain before joining ICN2, where he became Director in 2012. With over 225 publications and 34,000 citations, he has significantly contributed to materials science. A fellow of the American Physical Society, he co-founded SIMUNE and collaborates with industry on atomistic simulations, focusing on 2D materials and electronic transport.

Marie Laure Bocquet

First-Class Research Director (LPENS, ENS Paris, and CNRS)

A specialist in surface chemistry, Profesor Bocquet investigates chemical processes at metallic, oxide, and graphenic surfaces using high-resolution Scanning Tunneling Microscopy (STM) data. Her expertise in Density Functional Theory (DFT) supports the development of simulation tools for STM imaging, elastic and inelastic spectroscopy. With 92 publications, including articles in Science, Nature, and JACS, her work has received ~4,500 citations (H-index: 36). Research applications span heterogeneous catalysis, corrosion, graphene synthesis, gas sensors, and blue energy.

Cyril Aymonier

Director of ICMCB, Bordeaux

Cyril Aymonier, CNRS Senior Researcher at the Institute of Condensed Matter Chemistry of Bordeaux, specializes in high-pressure and high-temperature fluid chemistry, particularly supercritical fluids, for designing and recycling advanced nanostructured materials. With a PhD in Chemical Engineering from the University of Bordeaux and postdoctoral experience in Freiburg, his research includes nanomaterial synthesis, continuous multi-step processes, and sustainable recycling technologies. Author of over 200 publications with 7,000 citations (H-index: 43), he contribute to innovative materials science. His prolific teaching activity includes the international master's program *Advanced Materials Innovative Recycling* (AMIR).

Rodney D. Priestley

Dean of the Graduate School and Associate Director, Princeton Center for Complex Materials (PCCM)

Rodney D. Priestley, Ph.D. (Northwestern University, 2008), is a leading researcher in complex materials and processing, with a focus on nanoscale polymer characterization. His work explores how processing, confinement, and interfacial effects modify material properties for applications in membranes, coatings, nanocomposites, and colloidal systems. A 2023 Fellow of the American Physical Society, he has received numerous awards, including the ACS Marvel Award and AIChE Eminent Chemical Engineers Award. His research also emphasizes sustainable materials and green processing, contributing to advancements in polymer science and engineering. His influential work shapes the future of functional materials and nanotechnology.

Laura Na Liu

Director Physics Institute University of Stuttgart

Prof. Laura Na Liu received her Ph.D. in Physics at University of Stuttgart, Germany. She then worked as a postdoctoral fellow at the University of California, Berkeley and as a Texas Instruments visiting professor at Rice University, respectively. Before she became a professor at the Kirchhoff Institute for Physics at University of Heidelberg in 2015, she had worked as an independent group leader at the Max-Planck Institute for Intelligent Systems. In 2020, she joined University of Stuttgart and became the Director of the 2. Physics Institute. A pioneer of DNA nanotechnology, Professor Liu, has been working at the interface, where nanophotonics meets biology and chemistry.

Internal Advisory Committees

CFM operates through a system of internal advisory committees that foster participatory governance, ensure cross-functional coordination, and align daily operations with the strategic objectives of the centre. All committees report to the Centre Board, meet regularly, and may expand as new needs arise.

Science Committee

Oversees scientific activity, research planning, and evaluation of new projects and facilities prior to discussion by the Centre Board.

Composition: Marek Grzelczak, Daniel Sánchez Portal, Felix Fernandez Alonso, Julen Ibañez Azpiroz, Silvina Cerveny Murcia, and Celia Rogero Blanco.

Training Committee

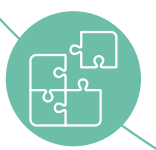
Designs and improves training programs for all career stages, ensuring alignment with institutional needs and and the effectiveness of professional development.

Composition: Ivo Souza, Deung-Jang Choi, Paula Malo de Molina Hernández, Miguel López Varga, and Silvina Cerveny Murcia.

Sustainability Committee

Promotes environmental responsibility by aligning CFM's activities with the UN Sustainable Development Goals, the European Green Deal, and CSIC's Sustainability Plan, thereby reducing the Centre's environmental impact.

Composition: Iker Cestero Bueno, Maider Laka Izagirre, Jorge Sánchez Dolado, Jon Maiz Sancho, Ana Sánchez Iglesias, and Silvina Cerveny Murcia.



Spaces Committee

Manages allocation and optimization ensuring the use of facilities.

Composition: Rubén González Moreno, Ester Verde Sesto, Paula Angulo Portugal, Ekain Ugalde Goldarazena, and Ion Errea Lope.

Occupational Risk Prevention Committee

Ensures health and safety compliance, risk assessment, training, and preventive workplace culture.

Composition: Lorena Ibaiondo Basañez, Rubén González Moreno, Ana Sánchez Iglesias, Isabel Asenjo Sanz, Gabriel Molina Terriza, and Celia Rogero Blanco.

Technology Transfer Committee

Identifies research with application potential and supports IP, collaboration, and innovation transfer to industry and society.

Composition: Guido Goracci, Rubén Pellicer Guridi, María Camarasa Gómez, Arantza Iturrioz Ezeiza, Arkaitz Nagore Ibero, and Ion Errea Lope.

Infrastructure and Services Committee

Coordinates shared scientific services, equipment management, maintenance, and integration with CSIC systems to ensure reliable and efficient operation of CFM's infrastructure.

Composition: Silvia Arrese-Igor Irigoyen, Martina Corso, Oskitz Párraga Larrinaga, Iñigo Aldazabal Mensa, and Silvina Cerveny Murcia.

Gender Equality Committee

Promotes equality and diversity, monitors gender balance, and develops inclusive policies in recruitment and career development, through the implementation of the II Gender Equality and Diversity Plan of CFM.

Composition: Zuzanna Lawera, Paschalis Agapitos, Isabel Pascual Robledo, Rubén Pellicer Guridi, Arantza Iturrioz Ezeiza, Jon Ganuza Jiménez, Nerea Zabala Unzalu, Ester Verde Sesto, Idoia Mugica Mendiola, Arkaitz Nagore Ibero, and Ion Errea Lope.

PROFILE

CFM STAFF

242

54%

of the Research Community is international

Researchers from

44

countries

EDUCATION

17

PhD Theses defended

6

Master Theses Defended

6

Undergraduate Projects

RESEARCH OUTPUT

ISI Publications

256

Q1 Publications

93%

International Collaborations

79%

Conferences, Workshops, Courses, and Seminars

66

SCIENCE AND SOCIETY

+60
Activities

+18 000
Atendees

PROJECTS AND FUNDING

Ongoing Projects
102

Spin Off
PHOTOKRETE

Patents 2022 – 2025
11

ACTIVITY IN MASS MEDIA

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56

Online press
205

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52

TV
5

NEWS

CFM RECEIVES ASPIRA-MAX SAGRARIO MARTÍNEZ CARRERA DISTINCTION TO BOOST SCIENTIFIC EXCELLENCE

In 2025 CFM was recognized by the National Research Council (CSIC) with the ASPIRA-MaX Sagrario Martínez Carrera distinction. This recognition, endowed with 300,000 euros, supports the implementation of CFM's scientific project and excellence plan, reinforcing its leadership in materials physics and aligning with strategic initiatives such as the IKUR strategy and Basque Q.

The funding contributes to consolidating laboratory equipment, recruiting specialized personnel, and implementing actions that promote internationalization, knowledge transfer, and scientific outreach.

ANDRÉS MOSQUERA, AWARDED THE MANUEL LABORDE WERLINDEN MASTER THESIS PRIZE AT THE XXV EDITION

The master's thesis Interphase Technologies was awarded the "Manuel Laborde Werlinden Prize" in its 25th edition. The project proposed a specialized service in surface and interface engineering aimed at optimizing functional polymeric materials for flexible and advanced electronics, and was developed by Andrés Mosquera at the CFM under the supervision of Jon Maiz Sancho and Alberto Álvarez Fernández.

This category includes a financial award of 3,000 euros, along with support from BIC Gipuzkoa to further develop the initiative.

INTERVIEW

PHOTOKRETE: building materials to combat urban heat

To tackle the urgent challenge of climate change and the 'heat island' effect, Photokrete has emerged as a spin-off whose technological approach is based on the development of a photonic mortar capable of reducing urban temperatures by up to 12°C through daytime radiative cooling, autonomously and without energy consumption.

Following years of research led by the CFM and driven by European projects (MIRACLE, CoolCrete) and technology transfer programmes such as IMPULSA-T, Photokrete S.L. was established as a spin-off of the CSIC, UPNA and the EHU, ready to take the technology to the next level of industrialisation. Three of its founders, **Jorge Sánchez Dolado, Guido Goracci, and Silvia Arrese-Igor Irigoyen**, from the Ceramic and Cementitious Materials area at CFM, review the project's development.

To further strengthen and support this successful line of research, the CFM has set up a new laboratory where it can fully realise its potential.

Photokrete originated at the CFM as part of the MIRACLE project. How has research into photonic cementitious materials led to a disruptive solution for the construction industry?

Photokrete S.L. is a clear example of how fundamental research can be transformed into applied innovation with a real impact on industry. Its origins at CFM, as part of the MIRACLE project, stem from an advanced scientific concept: passive radiative cooling, that is, the ability of certain materials to dissipate heat by emitting infrared radiation in specific ranges of the spectrum.

Although this phenomenon had been known for years, its first practical demonstrations — relatively recent — were based on materials that were unsustainable and difficult to scale up industrially. MIRACLE's major breakthrough was to adapt these physical mechanisms to cementitious materials, solving a key challenge: transferring a laboratory idea to one of the most widely used materials in the world and one with the greatest impact on the urban environment.

Thanks to this approach, functional concretes were developed that are capable of maintaining temperatures below ambient levels even when exposed to direct sunlight, a result that is particularly significant for combating the urban heat island effect and improving the energy efficiency of buildings and infrastructure.

This scientific breakthrough paved the way for its market introduction through initiatives such as the COOLCRETE project and the PHOTOKRETE project, which enabled the consolidation of technology transfer, the optimisation of the material for real-world applications, and the definition of a value proposition aligned with the sector's needs.

Thus, what began as research into photonic materials has become a disruptive solution: a concrete that not only fulfils structural functions but also actively interacts with the thermal environment, helping to mitigate the heat island effect and opening up new possibilities in sustainability and urban design.

This material not only builds, but also has a positive impact on the environment. What is the physical principle behind Photokrete that helps to mitigate the urban heat island effect more efficiently?

Thus, what began as research into photonic materials has become a disruptive solution: a concrete that not only fulfils structural functions but also actively interacts with the thermal environment, helping to mitigate the heat island effect and opening up new possibilities in sustainability and urban design.

This material not only builds, but also has a positive impact on the environment. What is the physical principle behind Photokrete that helps to mitigate the urban heat island effect more efficiently?

The physical principle on which Photokrete is based is passive radiative cooling, a phenomenon whereby all surfaces emit heat in the form of infrared radiation. Although this process occurs naturally, its effectiveness

depends on a key factor: the atmosphere only allows a portion of that radiation, within a very specific range of wavelengths, to escape into outer space, which acts as an extremely cold heat sink. The rest is absorbed or re-emitted by the atmosphere itself, which limits the cooling effect in conventional materials.

Photokrete is designed to make the most of this 'atmospheric window' (8–13 µm), optimizing its ability to emit heat within that range while simultaneously minimizing solar energy absorption thanks to its high reflectivity (over 95%). This dual behavior—high emissivity within the atmospheric window and low solar absorption—allows the material to dissipate more heat than it receives, even under direct solar radiation, reaching temperatures below its surrounding environment. As it is a completely passive process, requiring no energy consumption, it becomes a particularly effective solution for limiting heat accumulation on urban surfaces and mitigating the heat island effect compared to traditional materials.

With rising temperatures in cities, what real impact do you expect to have on people's lives?

According to estimates, using PhotoKrete on a city's rooftops can significantly reduce the city's temperature during a heatwave. By around 10–12 degrees during the day and around 5–7 degrees at night. Obviously, this reduction in temperature has a significant impact on people's health and quality of life. In fact, it is well documented that during heatwaves in hot urban areas there is an increase in the mortality rate, as heat becomes trapped and deprives residents of thermal relief during the night.

The project has received support and recognition. What stage is it at, and what has it meant for the team that the research has been validated outside the academic world?

The truth is that the awards came right from the start, and quite unexpectedly. We knew the technology was appealing, but we couldn't have imagined that at the first trade fair we attended (REBUILD, the most important one for industrialized construction) we would be awarded first prize for the tech start-up with the greatest potential in the sector. Of course, the award was a major boost that not only gave us confidence in an environment very different from the academic one, but also enabled us to attract strategic partnerships and focus development on real market needs, marking a decisive step towards turning research into a solution with tangible impact. Since then, there have been other milestones, notably winning the CSIC's 2026 First Transfer Award and being ranked in the global Top 50 of the most promising startups in the Contech ecosystem according to CEMEX Ventures.

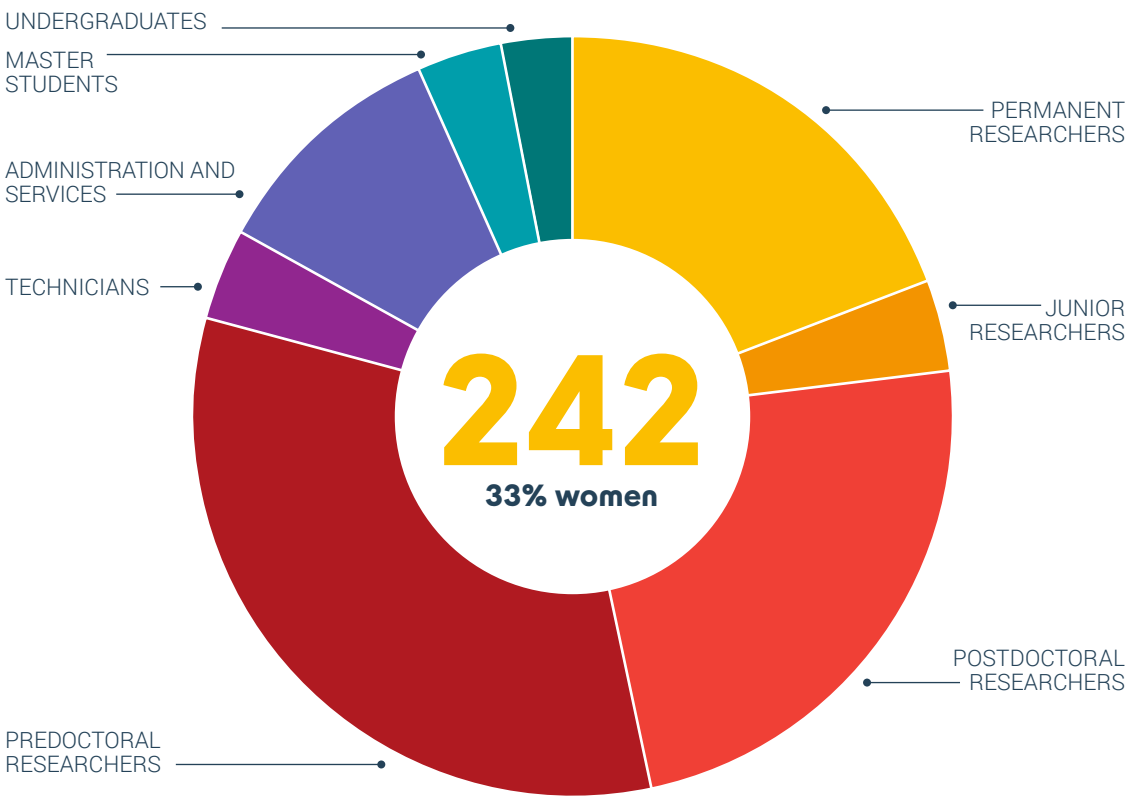
What is the next milestone you hope to achieve?

We are currently in an expansion phase where Photokrete products are being tested in various pilot projects (roofs for bungalows for a hotel chain in the Canary Islands, façades on several buildings at VivaPark in Vienna, and urban structures in the Barcelona sandbox). The aim of these large-scale trials is to demonstrate the technical and commercial viability of Photokrete products in order to gain market acceptance and generate our first commercial revenue.

Eneko Delgado Valle, **Silvia Arrese-Igor Irigoyen**, María Saiz Santos, **Jorge Sánchez Dolado, Guido Goracci**, Miguel Beruete Díaz, Alicia Torres García.

PEOPLE

ALL THE CFM COMMUNITY



Permanent Scientific staff	47
Junior Scientist	9
Postdoctoral Researchers	57
Predoctoral Researchers	79
Technicians	9
Administration and Services	25
Master Students	9
Undergraduates	7
Total	**242**

GUEST RESEARCHERS

43 23% women

Direction Board

Director: **Celia Rogero Blanco**
General Manager: **Amaia González Azpeitia**
MPC Manager: **Arkaitz Nagore Ibero**
Vicedirectors: **Ion Errea Lope and Silvina Cerveny Murcia**

Administration & Services

ADMINISTRATION

Ane Iturriza Senperena, Administrative, MPC
Annia Vázquez Fernández, Administrative, CSIC
Idoia Mugica Mendiola, Outreach Manager, MPC
Iker Cestero Bueno, Administrative, CSIC
Irene Ruiz Marmesat, Administrative, CSIC
Jon Ganuza Jiménez, Administrative, MPC
Lorena Ibaiondo Basañez, Occupational Risk Prevention, MPC
Maider Laka Izagirre, Administrative, MPC
María Formoso Ferreiro, Administrative, MPC
María José Sánchez Álvarez, Executive Secretary, EHU
Marta López Pérez, Administrative, MPC
Txema Ramos Fernández, Administrative, CSIC
Xabier Eizagirre Urdangarin, Administrative, CSIC

COMPUTING AND IT SERVICES

Ander Ramos Montero, IT Systems Technician, MPC
Iñigo Aldazabal Mensa, Scientific Computing Service, CSIC
Ioritz Paulis Garmendia, IT Systems Technician, MPC
Miguel García Folgado, Scientific Computing Service, Guest
Mikel Arocena Errazquin, Scientific Computing Service, CSIC
Urtzi Oliveras Egaña, IT Systems Technician, MPC

MAINTENANCE

Daniel Prego Imaz, CSIC
Ekain Ugalde Goldarazena, MPC
Jarvin Adelci Baca Sánchez, MPC

PROJECT MANAGEMENT AND TECHNOLOGY TRANSFER

Arantza Iturrioz Ezeiza, Head of project management, MPC
Oskitz Párraga Larrinaga, MPC
Tijn van den Berg, CSIC

Technical Staff

Amaia Iturrospe Ibarra, MPC
Laura Isabel Fernández Gómez-Recuero, EHU
Luis Botana Salgueiros, CSIC
María Isabel Asenjo Sanz, MPC
Rubén González Moreno, CSIC
Silvia Arrese-Igor Irigoyen, CSIC

RESEARCH COMMUNITY

CFM focuses on the study of four main strategic aspects of matter that cover some of the main structures and systems in advanced materials research, within the general objective to target excellence in the research on materials physics, namely: Molecules, Solid State Systems, Photons, and Soft Matter. The research activities in the center have thus been structured during the last years into the corresponding four research lines that give response to the aforementioned targets. The current research lines in the center are: (i) **Chemical Physics of Complex Materials**, (ii) **Electronic Properties at the Nanoscale**, (iii) **Photonics** and (iv) **Polymers, Soft Matter and Sustainable Materials-P(SM)$_2$**.


Gold nanoantenna
Design of the antenna

RESEARCH LINE:

Chemical Physics of Complex Materials

Combines advanced theoretical modeling and state-of-the-art experimental techniques to investigate the formation, properties, and reactivity of molecules and nanostructures at surfaces and interfaces. Our research spans from the fundamental understanding of energy- and environment-relevant reactions to the exploration of exotic quantum states in layered materials with tailored electronic and magnetic properties. Through a synergistic approach that integrates atomic-scale design, spectroscopy, and predictive simulations, we aim to uncover novel physical phenomena and functionalities relevant for catalysis, sensing, spintronics, and emerging quantum technologies.

PERMANENT RESEARCHERS

Andrés Arnau Pino, University Professor, EHU

Celia Rogero Blanco, Tenured Scientist, CSIC

Daniel Sánchez Portal, Research Professor, CSIC

Enrique Ortega Conejero, University Professor, EHU

Frederik Michael Schiller, Scientific Researcher, CSIC

Iñaki Juaristi Oliden, University Professor, EHU

Lucia Vitali, Ikerbasque Professor, EHU

Maider Ormaza Saezmiera, EHU

Maite Alducin Ochoa, Tenured Scientist, CSIC

María Blanco Rey, EHU

Martina Corso, Tenured Scientist, CSIC

Maxim Ilin, Tenured Scientist, CSIC

Nicolás Lorente Palacios, Scientific Researcher, CSIC

Roberto Robles Rodríguez, Tenured Scientist, CSIC

IKERBASQUE ASSOCIATES

Deung-Jang Choi, MPC

Marco Gobbi, MPC

Sara Barja Martínez, EHU

IKERBASQUE FELLOWS

Ignacio Piquero Zulaica, MPC

Sara Catalano, MPC

POST-DOCTORAL RESEARCHERS

Adriana Candia, MPC

Afaf El-Sayed, MPC

Alfredo Serrano Jiménez, EHU

Chen-How Huang, MPC

Jose Eduardo Barcelon, DIPC

Manuel Suárez Rodríguez, MPC

María Camarasa Gómez, MPC

María Ramos Vázquez, MPC

Mattia Bassotti, CSIC

Natalia Koval, CSIC

Peisen Yuan, MPC

Sebastien Elie Hadjadj, MPC

Shayan Edalatmanesh, CSIC

Sofia Sanz Wuhl, CSIC

Stefano Trivini, MPC

PRE-DOCTORAL RESEARCHERS

Alaa Mohammed Idris Bakhit, MPC

Alfonso Yubero Navarro, DIPC

Andrea Aguirre Baños, CSIC

Angel Rodríguez Alcaraz, MPC

Aymeric Saunot, DIPC

David Caldevilla Asenjo, CSIC

Divya Jyoti, DIPC

Ivan Zugec, MPC

Malen Etxeberria Etxaniz, EHU

Matyas Nachtigall, CSIC

Paula Angulo Portugal, MPC

Samuel Kerschbaumer, MPC

Sandra Sajan, DIPC

Sebastian Negrete Aragón, MPC

Sruthibhai Palakkattu Kunnu Venugopalan, MPC

GUEST RESEARCHERS

Amaia Ortega Santos, Pre-doctoral Researcher

Ancy Mini Vibin, Pre-doctoral Researcher

Bruno Pérez Gómez, Master Student

Iñigo Vilaseco Extramiana, Master Student

Javier García de Abajo, Senior Scientist

Joseph Sink, Post-doctoral Researcher

Manish Kumar, Pre-doctoral Researcher

Marco Antonio Alcázar Peredo, Master Student

Muhammad Saad Mahmood, Pre-doctoral Researcher

Ondrej Spacek, Pre-doctoral Researcher

Palmerina González Izquierdo, Post-doctoral Researcher

Pavel Jelinek, Senior Scientist

Pietro Cattaneo, Master Student

Shreya Sinha, Post-doctoral Researcher

Sofia de Oliveira Parreiras, Post-doctoral Researcher

Soohyon Phark, Senior Scientist

Stefano Vigneri, Pre-doctoral Researcher

RESEARCH LINE:

Electronic Properties at the Nanoscale

This research line investigates the electronic properties of solids, nanostructures, and low-dimensional systems aiming to understand the fundamental mechanisms that govern the behavior of matter. Our research explores both ground and excited electronic states and their response to various perturbations, across a wide spectrum of materials—from quantum materials like Weyl semimetals, superconductors, and altermagnets to everyday compounds such as cement. Spanning scales from the atomic to the mesoscopic and even macroscopic, this work provides key insights for applications ranging from advanced devices to structural materials.

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RESEARCH LINE:

Photonics

The control of the interaction of light with a variety of nanostructures and novel (hybrid) materials opens new possibilities to discover and explore novel classical and quantum phenomena at the nanoscale. The potential of these effects to develop sustainable and quantum applications, as well as to improve health and well-being, can be studied by combining new active devices, custom-made metallic and phononic nanostructures, quantum emitters with complementary properties, and a variety of theoretical methods. These advances can be pursued through the use of sophisticated experimental and theoretical methodologies.

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Mikael Gallego, Master Student

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RESEARCH LINE:

Polymers, Soft Matter & Sustainable Materials

Designs sustainable, biocompatible, and non-cytotoxic functional materials using green synthesis strategies, such as eco-friendly solvents and safer catalysts. Our research follows a multi-pronged approach that combines quantum beams—including neutron scattering—advanced simulations, and experimental techniques to interrogate and understand the structure, dynamics, and properties of soft matter and hybrid systems. This integrated strategy enables the development of novel materials for energy applications, nanoelectronics, lighting, sensing, medicine, and environmental remediation.

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Hector Aguilar Bolados, Senior Scientist

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Matteo Venturi, Pre-doctoral Researcher

Matthias Gutmann, Senior Scientist

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Tudor George Pirpilita, Undergraduate Student

Maider Belver Errazkin, Vocational Training (Don Bosco)

Goiatz Nieto Alberdi, Other, Vocational Training (Don Bosco)

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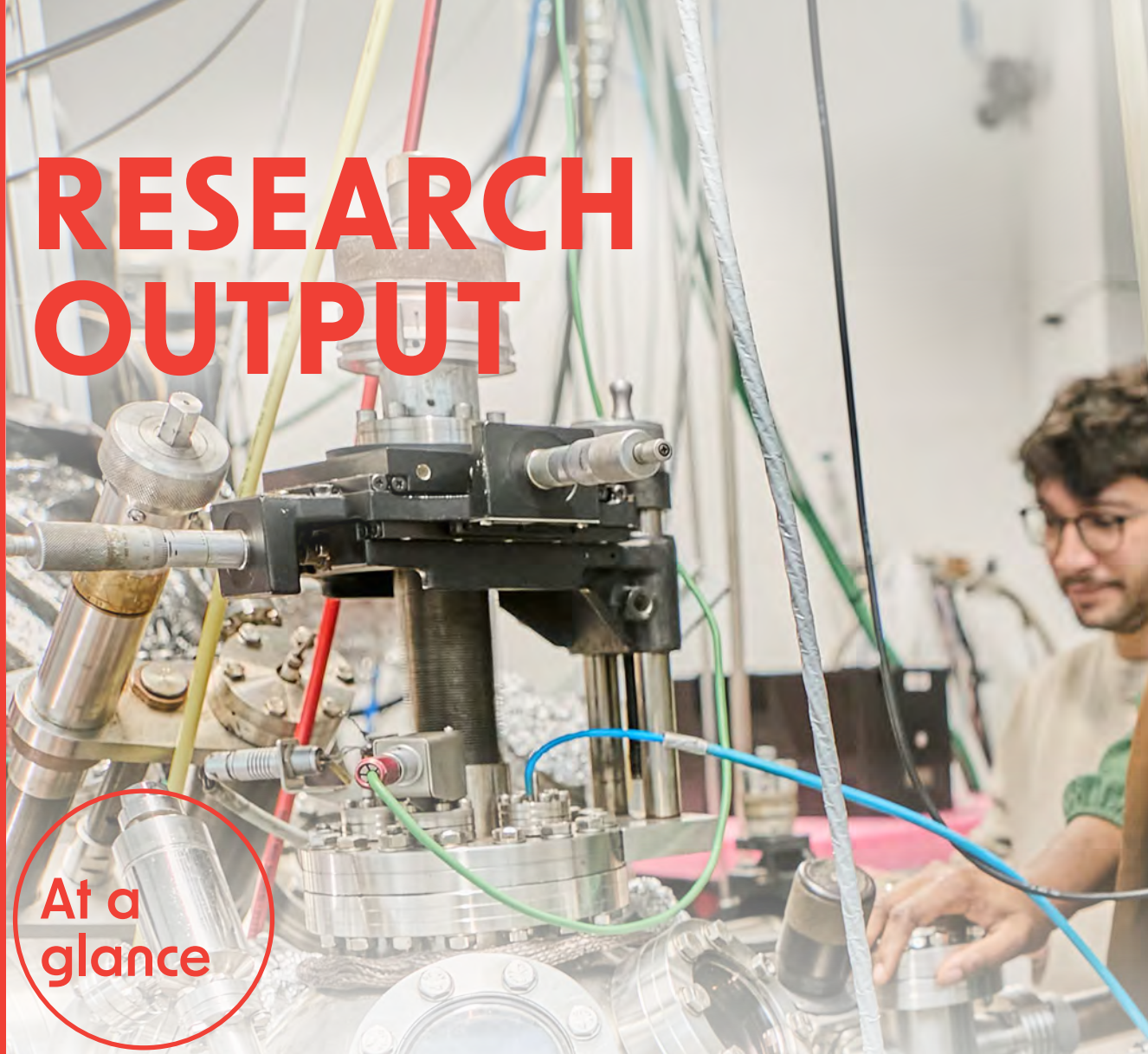
PRE-DOCTORAL RESEARCHERS

Ainara Ruiz Bardillo, MPC

RESEARCH OUTPUT



At a glance

256
ISI Publications

79%
Published in the Framework of International Collaborations

5
Book Chapters

93%
Q1

56%
D1

13%
C1

H-Index
153

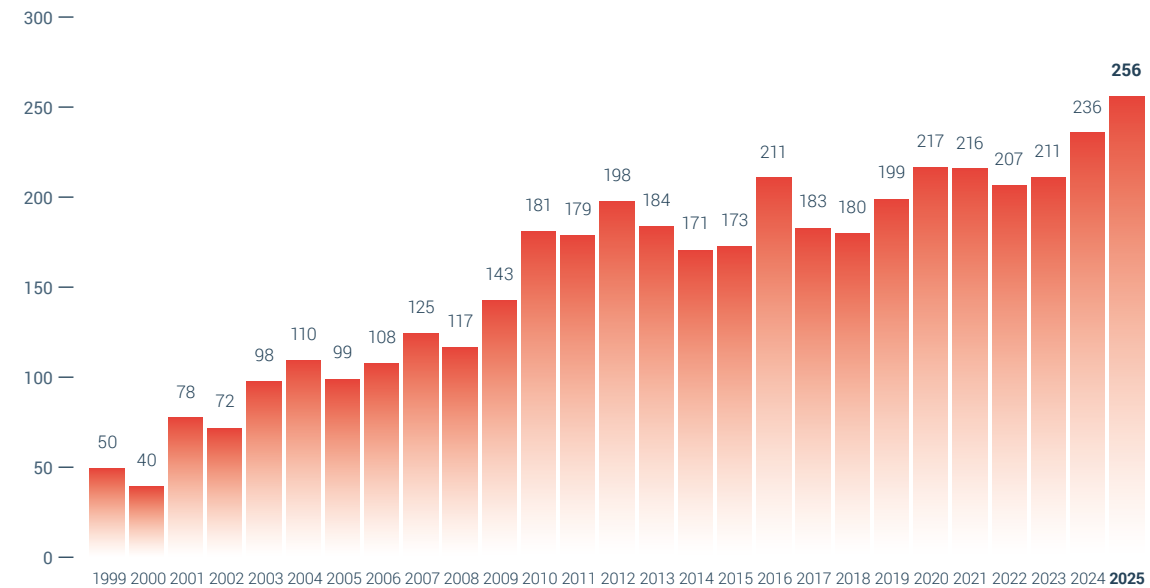
ISI Web of Science citations
14 660 in 2025
As of April 2026

In 2025, continuing with the line of excellent scientific results of recent years, the CFM published 256 articles **in top journals** of the area, 93% in Q1 journals, 56% in D1 and 13% in C1.

More than 79% of the indexed publications correspond to articles published in **collaboration with international entities**, a fact that reflects the international excellence of the work carried out in the area of materials science at CFM. Some outstanding institutions with which the CFM has collaborated in 2025 are: Max Plank Society, Massachusetts Institute of Technology (MIT), University of Cambridge, and Lawrence Berkeley National Laboratory.

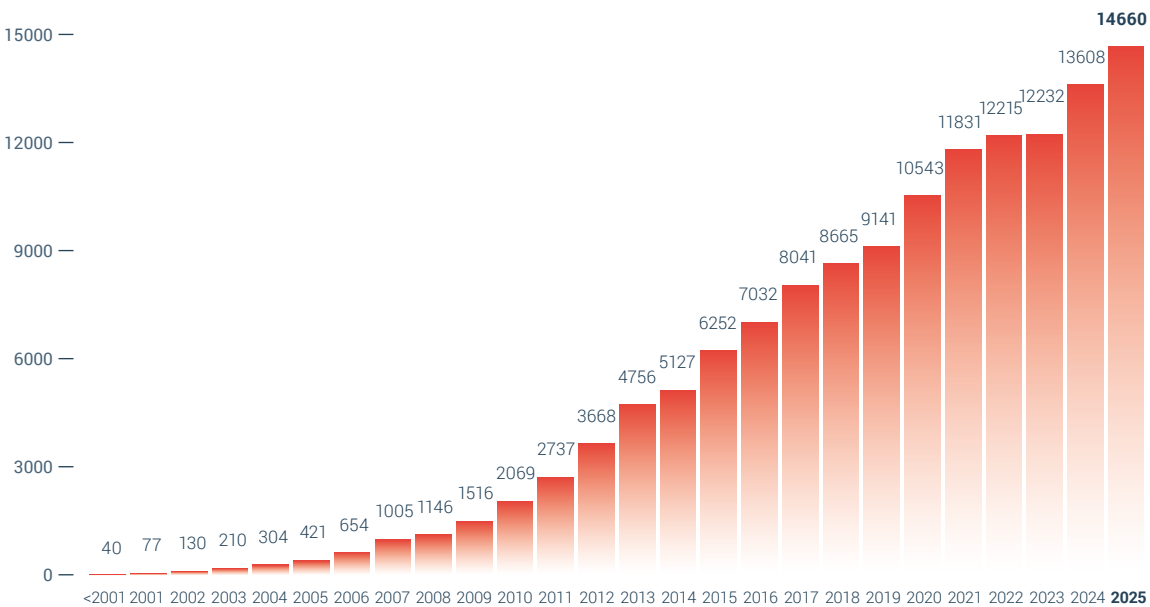
PUBLICATIONS

Total number of ISI Publications since 1999 as of April 2026: **4242**



CITATIONS

Total number of citations since 1999 as of April 2026: **138 080**
H index (April 2026): **153**



Total number of top publications: 77

JOURNAL	Nº OF PUBLICATIONS	SJR
Nature	2	19,713
Nature Materials	2	13,131
Nature Electronics	1	12,43
Science	1	10,948
Advanced Materials	5	8,266
Advanced Energy Materials	1	7,677
Nature Physics	1	6,581
Cement and Concrete Research	1	6,233
Nature Synthesis	1	6,18
Angewandte Chemie - International Edition	2	5,495
Journal of the American Chemical Society	1	5,491
Advanced Functional Materials	5	5,022
LIGHT-SCIENCE & APPLICATIONS	1	4,946
Materials Today	1	4,909
Nature Communications	10	4,904
Science Advances	4	4,534
Nature Computational Science	1	4,252
ACS Nano	12	4,102
Advanced Science	4	3,288
npj Computational Materials	1	2,943
Physical Review X	1	2,79
Physical Review Letters	6	2,79
Small	4	2,653
Nano Letters	9	2,594

HIGHLIGHTS

HIGHLIGHT 1

Plastic ice VII: a new exotic phase of water ice*

*Rescigno M, Toffano A, **Ranieri U**, Andriambariarijaona L, Gaal R, Klotz S, Koza MM, Ollivier J, Martelli F, Russo J, Sciortino F, Teixeira J, and Bove LE.*

Nature 640, 662 (2025)

Water continues to reveal unexpected behaviors under extreme conditions. In this recent study published in Nature, first experimental evidence of plastic ice VII was reported — a long-predicted orientationally disordered phase in which water molecules retain the crystalline structure of ice VII but rotate around their center of mass.

In this extremely challenging study, using a combination of high-pressure neutron scattering experiments and advanced computational modelling, the investigators observed that at temperatures above approximately 470 K and pressures exceeding 4 GPa, ice VII transitions into its plastic state. Unlike traditional ice, where molecular motion is frozen, plastic ice VII exhibits rapid molecular reorientations akin to those in a liquid. The combined experimental data and simulations revealed that the water molecules in plastic ice VII do not rotate freely; instead, they jump randomly between a few favored orientations.

This discovery has significant implications for condensed matter physics as well as planetary science. Notably, plastic ice VII may exist in the deep interiors of icy moons and exoplanets.

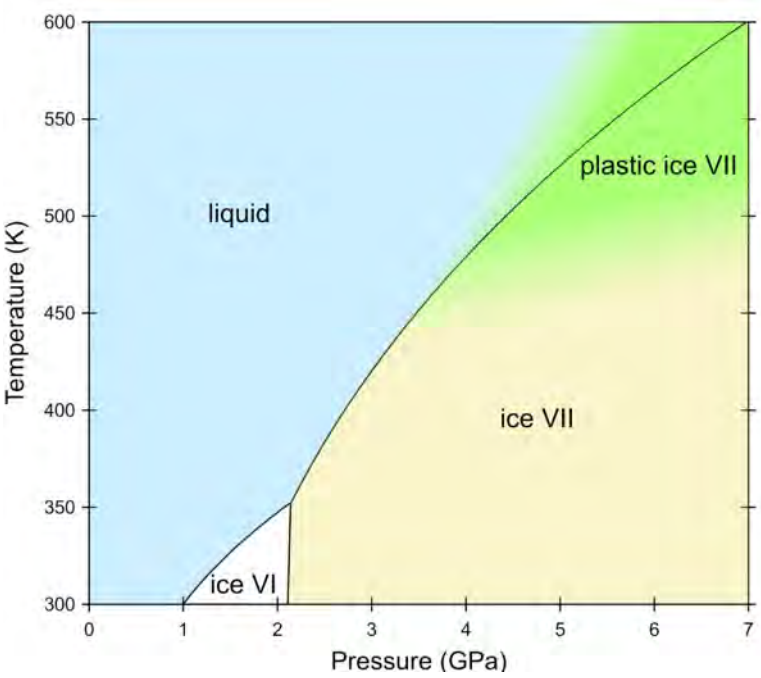


Figure: *Phase diagram of water covering the temperature-pressure ranges of interest. The region of stability of plastic ice VII as inferred from the current study is highlighted in green.*

* Original publication title: Observation of plastic ice VII by quasi-elastic neutron scattering

HIGHLIGHT 2

Transforming achiral semiconductors into chiral domains with exceptional circular dichroism

Ugras TJ, Carson RB, Lynch RP, Li H, Yao Y, Cupellini L, Page KA, Wang D, ***Arbe A****, Bals S, Smieska L, Woll AR, Arteaga O, Jávorfi T, Siligardi G, Pescitelli G, Weinstein SJ, and Robinson RD.*

Science 387, 490 (2025)

The creation of mesoscale chiroptic materials from nanoscale achiral building blocks has been previously realized, but extending excitonic chirality to inorganic semiconducting systems has remained elusive. Among the many challenges to achieving this goal is the need for degenerate excited electronic states, which are difficult to obtain in nanocrystals with nonzero size distributions, and the requirement for aligned transition dipoles, unlikely characteristic in spherical nanocrystals that lack a distinct axis. This goal is consequential, as introducing chirality into the band structure of semiconductors enables simultaneous control over light, spin, and charge, key capabilities for driving innovations in next-generation photonic, optoelectronic, and spintronic technologies.

In this collaborative work, a method to form chiral films of three different inorganic semiconductor nanocrystals, with near-limit dissymmetry factors and large homochiral domains is reported. The mechanism behind these organized assemblies is elucidated through linear dichroism, small-angle x-ray scattering carried out at the CFM, and in situ microscopy. Structural results for three different semiconducting nanocluster systems demonstrate the generality of the method, suggesting the applicability to other nanocluster species or colloidal nanoplatelets. The experiments uncovered the key mechanisms for achieving these chiroptic films by the meniscus-guided deposition process, including the alignment of transition dipoles of the constituents and the fluid flows responsible for twisting the fibers, and make a connection to emergent chiral properties. Harnessing methods to form chiral films from achiral, solution-processable semiconductors offers an opportunity in the design and fabrication of complex chiroptical metamaterials in ways that are both scalable and versatile. Beyond nanocluster films, this study provides valuable insights into the complexities of hierarchical assembly found in nature and offers a pathway to extend these principles to other chiral molecules and nanomaterials for engineering sophisticated, twisted structures.

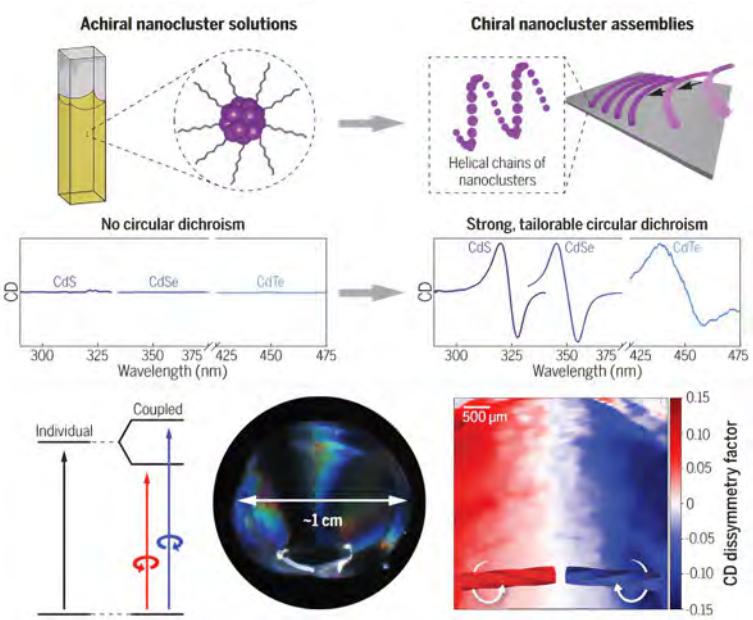


Figure: *Chiral assemblies from achiral nanoclusters. Semiconducting magic-sized nanoclusters can form helical assemblies through meniscus-guided deposition. Degenerate excited states split into nondegenerate states upon coupling, producing exciton couplets in CD spectra. Controlling the evaporation geometry produces high-fidelity films with handedness imparted onto the fibers, forming various domain shapes and sizes with homochiral domains exceeding 6 mm2 that transition smoothly between left- and right-handed chirality.*

HIGHLIGHT 3

Breaking Ohm's law: nonlinear currents emerge in symmetry-broken materials*

Suárez-Rodríguez M, de Juan F, ***Souza I***, ***Gobbi M***, *Casanova F and Hueso LE.*

Nature Materials 24, 1005-1018 (2025)

In a review just published in Nature Materials, Manuel Suárez-Rodríguez—working under the guidance of Ikerbasque Professors Fèlix Casanova and Luis E. Hueso at CIC nanoGUNE, together with Prof. Marco Gobbi at the Materials Physics Center (CFM, CSIC-UPV/EHU)—takes aim at the oldest principle in electronics: Ohm's law. Their article, "Nonlinear transport in non-centrosymmetric systems", brings together rapidly growing evidence that, when a material lacks inversion symmetry, the familiar linear relation between current and voltage can break down, giving rise to striking quadratic responses.

"Over the past five years we have observed numerous reports of nonlinear transport effects intimately linked to the symmetry of the host material," explains lead author Suárez-Rodríguez. "Once we grasped this connection, our goal was to weave the disparate results into a coherent picture that condensed-matter and materials physicists can exploit to advance this promising field."

Co-authors Fernando de Juan (Donostia International Physics Center, DIPC) and Ivo Souza (CFM) helped clarify how broken inversion symmetry unlocks new microscopic mechanisms—chief among them the Berry-curvature dipole and the recently proposed Berry-connection polarizability—that generate nonlinear and rectification voltages directly from an applied bias. "Because these mechanisms are intrinsic to the material itself—not to interfaces or external stimuli—they can operate across a wide frequency range and down to the single-layer limit," adds Suárez-Rodríguez.

Beyond fundamental interest, the team highlights two application frontiers. First, nonlinear effects provide a versatile and powerful route to probe charge-to-spin conversion, helping identify candidate materials for next-generation spintronics. Second, these effects can be harnessed for wireless radio-frequency rectification, promising size reductions of several orders of magnitude relative to state-of-the-art devices and enabling rectification at, or even below, the microscale—opening possibilities for on-chip RF harvesters and biosensors.

With more than 450 accesses in just two days, the review is already serving as a roadmap for researchers developing quantum-enabled electronics—where "breaking the rules" of Ohm's law is the key.

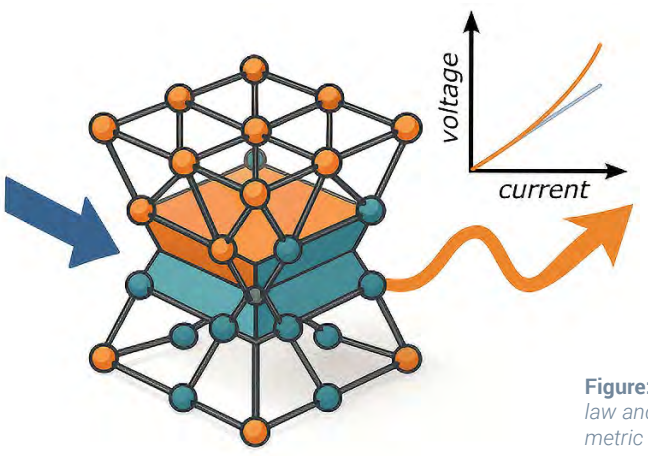


Figure: *Artistic representation of the breakdown of Ohm's law and the resulting nonlinear effects in a non-centrosymmetric crystal.*

* Original publication title: Nonlinear transport in non-centrosymmetric systems

HIGHLIGHT 4

A functional 2D carbon allotrope combining nanoporous graphene and biphenylene segments

***Angulo-Portugal P**, Irizar M, Huang L, Sarker M, Ashoush MA, Abd El-Fattah ZM, Barth J, **Schiller F**, **El-Sayed A**, Gao F, de Oteyza DG, Sinitskii A, Garcia-Lekue A, **Corso M**, and **Piquero-Zulaica I**.*

Advanced Materials, e11706 (2025)

Carbon is one of the most versatile elements, capable of forming structures ranging from graphite to diamond. Among its two-dimensional forms, graphene has attracted enormous interest for its strength and conductivity, but its lack of a bandgap limits its use in digital electronics, where controlled on/off switching is essential. To address this challenge, a recent study in *Advanced Materials*, led by Dr. Martina Corso (CFM), Prof. Aran Garcia-Lekue (DIPC) and Dr. Ignacio Piquero-Zulaica (CFM), presents the synthesis and characterisation of a previously unrealized 2D carbon allotrope. This material combines a graphene backbone with engineered [18]-annulene nanopores and alternating four- and eight-membered rings known as biphenylene segments.

This achievement relies on atomic precision through bottom-up synthesis. The group of Prof. Sinitskii (University of Nebraska) designed specific molecular precursors that, when deposited on gold and thermally activated in ultra-high vacuum conditions, first assemble into 12-pGNRs and subsequently fuse laterally. This method avoids the formation of defects typical of conventional fabrication, producing a continuous nanoporous graphene (NPG) lattice with a periodic arrangement of four-, six-, and eight-membered rings, as confirmed by low-temperature STM and nc-AFM measurements with CO-functionalized tips. By precisely controlling the geometry of the pores and ring segments, researchers can dictate how electrons move through the material, effectively programming its electrical and mechanical behavior.

The structure starts from 12-atom-wide armchair graphene nanoribbons incorporating [18]-annulene pores. These pores interrupt the hexagonal lattice, altering the material's electronic band structure as observed by angle-resolved photoemission spectroscopy. Depending on whether the ribbons connect through graphene-like or biphenylene-like junctions, the resulting allotrope can display a direct or indirect bandgap, providing a versatile platform for electronics. DFT modelling and STS show that electronic states near the bandgap are localized between the pores, suggesting that electronic behavior can be tuned by choosing the type of segment connecting them.

The introduction of pores slightly softens the material but the biphenylene units help reducing mechanical anisotropy, resulting in a more uniform response to stress. This offers an advantage for device integration when toleration to stretching or varying pressures is required.

Crucially, the nanopores act as chemically active sites. Gas-adsorption experiments reveal a selective affinity for CO over oxygen, demonstrating the potential of these structures for highly sensitive chemical sensing given their high chemical stability when exposed to air.

Overall, this work introduces a tunable 2D carbon allotrope that unites electronic, mechanical, and chemical design at the atomic scale, opening promising avenues for next-generation nanoelectronics, sensing devices, and functional membranes.

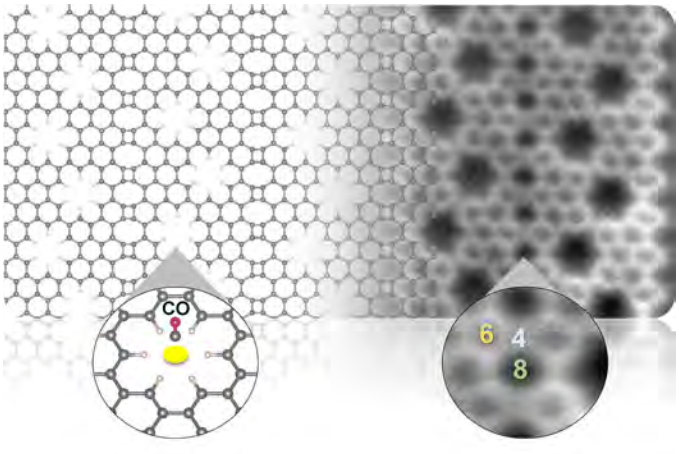


Figure: *A nanoporous graphene (NPG) structure combining periodically spaced [18]-annulene nanopores and biphenylene segments. While the nanopores serve as active sites for interacting with CO molecules, the biphenylene segments induce an indirect bandgap to this semiconducting 2D material.*

HIGHLIGHT 5

Does altermagnetism persist at the 2D limit?*

*Cuxart M, **Robles R**, Muñiz Cano B, Gargiani P, Rebanal C, Di Bernardo I, Amiri A, Calleja F, Garnica M, Valbuena M, and Vázquez de Parga A.*

Advanced Functional Materials, e16924 (2025)

Altermagnetism, a newly established symmetry-based class of magnetic order beyond conventional ferromagnetism and antiferromagnetism, has rapidly emerged as a central research topic in condensed matter physics. Notably, 3-dimensional (3D) MnTe has become a benchmark material where altermagnetic manifestations and consequences have been shown in the last couple of years.

In this work, a team of scientists from IMDEA Nanociencia, Materials Physics Center (CSIC – EHU), Universidad Autónoma de Madrid, IFIMAC and ALBA Synchrotron address a fundamental open question in the field: Does altermagnetism persist down to the 2D limit? To answer this question, they have employed a comprehensive experimental and theoretical approach that combines scanning tunneling microscopic and x-ray circular magnetic dichroic measurements of atomically thin MnTe monolayers and bilayers grown by molecular beam epitaxy, with DFT.

The team has shown that when thinned to the monolayer and bilayer limit, MnTe adopts crystal symmetries incompatible with the emergence of altermagnetism. Instead, the bilayer becomes a remarkably more robust layered antiferromagnet and the monolayer forms a frustrated magnetic phase exhibiting a behavior consistent with that of a spin-glass—a phase never observed at the atomic limit. These findings reveal how symmetry breaking and frustration-induced magnetism in 2D MnTe give rise to magnetic states distinct from its 3D altermagnetic behavior, with implications for engineering nontrivial spin textures in low-dimensional materials.

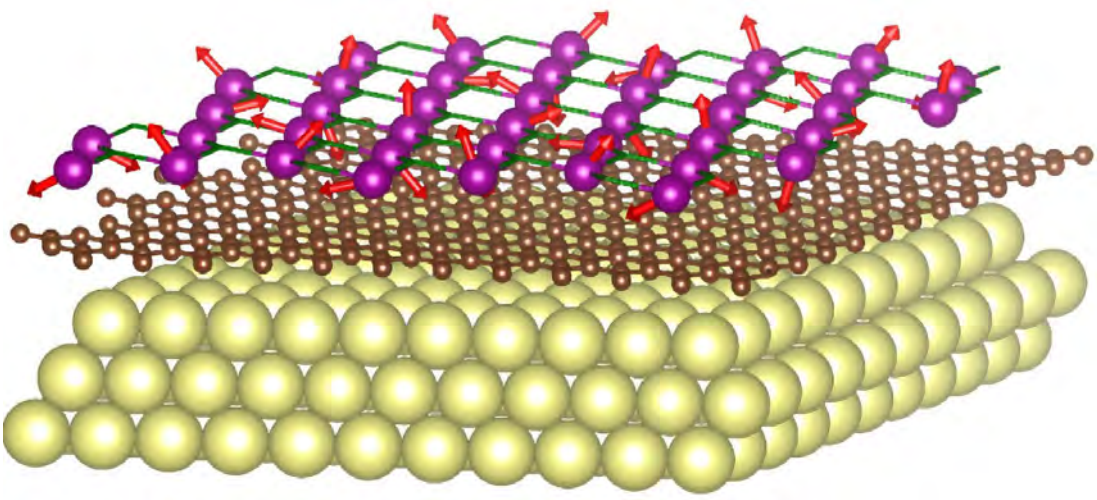


Figure: *Non-collinear magnetic configuration of a MnTe monolayer due to the frustration of the antiferromagnetic coupling in a hexagonal lattice.*

* Original publication title: Emergent Magnetic Structures at the 2D Limit of the Altermagnet MnTe

HIGHLIGHT 6

Peptide-guided self-assembly: fabricating tailored spiral-like nanostructures for precise inorganic templating

Alvarez-Fernandez A, *Pawar N, Sánchez-Puga P, Zaccai N, and* ***Maestro A***.

Advanced Functional Materials 35, 2411061 (2025)

Self-assembling peptides represent a frontier in nanomaterial fabrication, offering unprecedented control over hierarchical structures. However, creating spiral nanoarchitectures—which mimic natural systems and hold promise for optical and catalytic applications—has remained challenging due to fabrication limitations and lack of precise structural control.

This work demonstrates that two fusion peptide sequences derived from the SARS-CoV-2 Spike protein can spontaneously form well-defined nanostructures when assembled at air-water interfaces under controlled surface compression. AFM imaging was instrumental in revealing how subtle differences in amino acid composition yield fundamentally different morphologies. The sequence richer in hydrophobic residues (Leu, Ile, Val) generates long, straight fibrils with minimal curvature, reflecting a high persistence length (Lp ≈ 3.2 μm). Although this sequence exhibits a less extensive β-sheet content, its more homogeneous secondary structure produces a continuous hydrogen bonding network that confers rigidity. In contrast, the sequence containing a greater proportion of charged and polar residues (Lys, Asp, Gln) adopts a higher β-sheet content, yet electrostatic repulsion and solvation effects introduce local disruptions that act as flexible hinge points along the fibrils. The resulting lower persistence length (Lp ≈ 0.12 μm) allows these fibers to curve and fold upon themselves, forming intricate spiral-like nanostructures.

AFM analysis further demonstrated that by systematically varying surface pressure, spiral characteristics such as curvature angle and inter-fiber spacing can be precisely tuned. Complementary neutron reflectometry and interfacial shear rheology measurements revealed a fluid-to-solid transition at, where the fibril network develops gel-like elastic behavior driven by molecular packing at the interface.

The most significant application potential lies in the ability to use these peptide spirals as templates for metallic replicas. Using aqueous metal reduction methodology with $HAuCl_4$, followed by UV/O_3 treatment, the team successfully created gold nanostructures that replicate the original spiral morphology. XPS analysis confirmed complete peptide removal and successful gold incorporation, yielding pure inorganic structures with sub-10 nm features. This fabrication approach offers several advantages over conventional lithographic techniques: it operates at low energy input, provides excellent structural uniformity across large areas, and enables precise control over curvature and inter-fiber spacing. The methodology's versatility extends to different inorganic species, opening pathways for tailored plasmonic materials with unique optical, electronic, and catalytic properties.

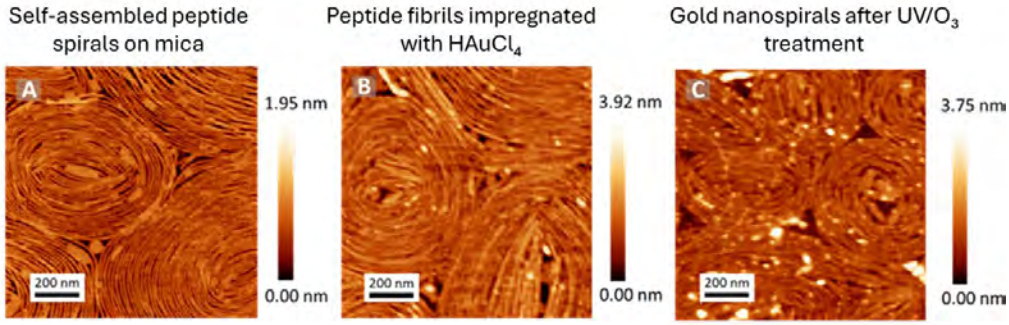


Figure: *A) pristine FP2 peptides at 20 mN m−1 surface pressure onto mica substrates, B) after 30 min immersion into the HAuCl4 solution, and C) after the subsequent UV/O3 degradation treatment.*

HIGHLIGHT 7

Thermally-induced nickelocene fragmentation and one-dimensional chain assembly on Au(111)

***Jyoti D**, Fétida A, Limot L, **Robles R**, **Lorente N**, and **Choi DJ**.*

Communications Chemistry 8, 117 (2025)

Controlling the adsorption, transformation, and assembly of molecules on surfaces is a central goal in nanoscience, because it enables the fabrication of functional structures with tailored electronic, chemical, and magnetic properties. In this work, nickelocene ($NiCp_2$) deposited on Au(111) is investigated using low-temperature scanning tunneling microscopy (STM), scanning tunneling spectroscopy (STS), and density functional theory (DFT).

A key result is that the substrate temperature during deposition determines two very different regimes. When nickelocene is deposited at low temperature, the molecules remain intact and adsorb preferentially at herringbone elbows and step edges, where they can also form ordered islands. By contrast, when the molecules are deposited on Au(111) held at room temperature, nickelocene dissociates and produces two main fragments: NiCp species and isolated Cp rings.

The most significant finding is that the NiCp fragments self-assemble into one-dimensional chains aligned along specific crystallographic directions of the Au(111) surface. At higher coverage, these chains can further organize into larger triangular patterns. The combined experimental and theoretical analysis shows that this assembly is governed by the adsorption of the Ni atom on FCC hollow sites of the gold surface, together with steric effects between neighboring cyclopentadienyl ligands. The study also identifies two distinct dimer configurations of the NiCp fragments, one of which is stabilized by the incorporation of a gold adatom between the fragments.

From the electronic and magnetic point of view, the work demonstrates that the dissociation fragments lose the magnetic character of intact nickelocene because of their strong hybridization with the Au(111) substrate. This highlights the active role of the surface not only in molecular dissociation, but also in determining the dimensionality, stability, and functionality of the resulting nanostructures. More broadly, the study establishes thermally induced fragmentation as an effective route to engineer surface-confined one-dimensional architectures derived from metallocenes, opening new possibilities for on-surface synthesis and for future exploration of low-dimensional magnetic systems on less quenching substrates.

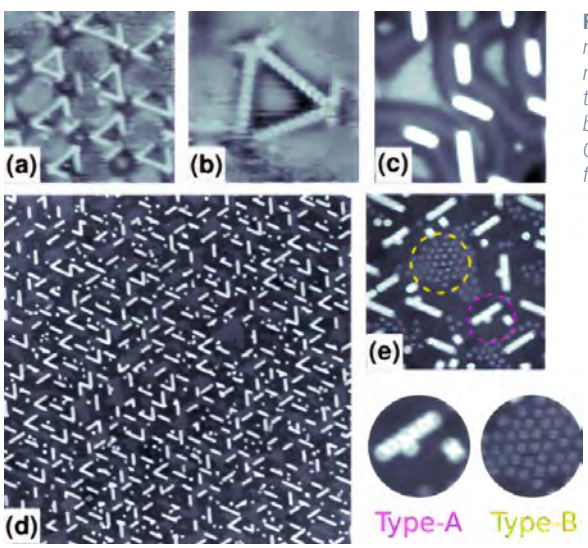


Figure: *STM images showing the thermal dissociation of nickelocene on Au(111) and the emergence of new surface nanostructures. After deposition at room temperature, two types of fragments appear: NiCp species, which self-assemble into one-dimensional chains and triangular motifs, and Cp fragments, which form more isotropic aggregates. This figure summarizes the central result of the work.*

HIGHLIGHT 8

Strong in-plane magnetism in semiconducting monolayer $CoCl_2$

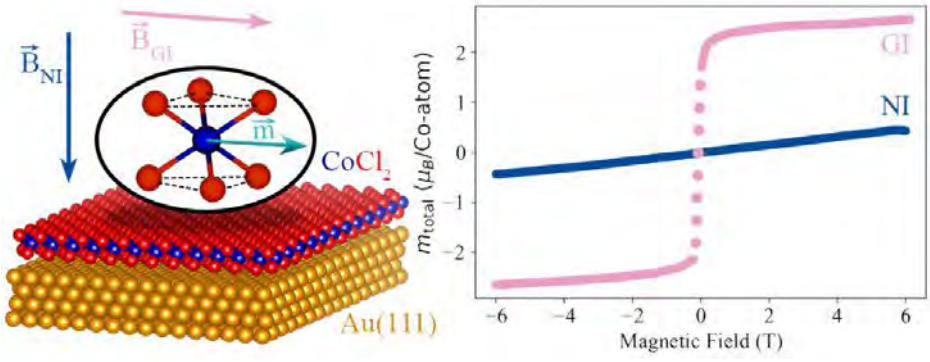
Kerschbaumer S, Hadjadj SE, Aguirre-Baños A, *Longo D, Pinar Solé A, Stetsovych O, Candia AE,* ***Angulo-Portugal P, Caldevilla D****, Choueikani F,* ***Corso M****, Serrate D, Lobo-Checa J, Jelínek P, Ilyn M, and* ***Rogero C****.*

ACS Nano 19, 20693 (2025)

Two-dimensional magnets are emerging as key elements for future spin-based electronics, thanks to their layered structure and tunable magnetic properties. Among these, transition metal dihalides (TMDHs) are particularly interesting due to their simple structure and compatibility with nanofabrication techniques. In this work, we demonstrate that epitaxially grown monolayer $CoCl_2$ on Au(111) is a semiconducting 2D ferromagnet with exceptionally strong in-plane magnetic anisotropy.

Using a combination of surface-sensitive measurement techniques, we characterize the growth, electronic structure, and magnetic response of $CoCl_2$ down to the atomic scale. Scanning probe microscopy shows that $CoCl_2$ forms smooth and ordered islands that are isostructural to the bulk phase, with minimal interaction with the underlying Au(111) surface, consistent with the behavior of van der Waals materials. This weak coupling allows the characteristic herringbone reconstruction of the gold substrate to remain intact and enables the $CoCl_2$ layer to grow continuously across step edges. Although spectroscopic data revealed a large bandgap of approximately 3.9 eV, in-gap states originating from the interface between the $CoCl_2$ layer and the Au substrate were recorded. These states vary spatially and suggest local electronic modulation due to the lateral mismatch between the bottom Cl layer and Au(111). We also show that the $CoCl_2$ film modifies the Au(111) surface state by shifting its dispersion to higher energies and simultaneously maintaining a nearly free-electron character, with minimal scattering. Magnetic analysis reveals a Curie temperature of 24 K and a strong in-plane anisotropy, saturating under in-plane magnetic fields below 1 T. In contrast, no saturation is observed for out-of-plane fields up to 6 T. From the two magnetization loops, we calculated an anisotropy field of 31 T, corresponding to an anisotropy energy of 1.6 meV per cobalt atom. This is a surprisingly high value when compared to other 2D magnetic thin-films like CrI_3 or $FeCl_2$. Importantly, the measured magnetic moment per Co atom is lower than the ideal value predicted by Hund's rules. This reduction could stem from a combination of crystal field effects, weak orbital overlap with the ligands, and small lattice distortions induced by the substrate. Despite this, the ferromagnetic order remains robust and uniform across different thicknesses.

This study establishes monolayer $CoCl_2$ as a stable, semiconducting 2D ferromagnet with strong in-plane magnetic anisotropy. Its ability to grow in an orderly fashion via sublimation under mild conditions makes it a promising material for integration into van der Waals heterostructures and nanoscale spintronic technologies.



HIGHLIGHT 9

What is the maximum critical temperature of conventional superconductors at ambient pressure?*

Gao K, Cerqueira T, Sanna A, ***Fang YW***, ***Dangić Đ***, ***Errea I***, *Wang HC, Botti S, and Marques MA.*

Nature Communications 16, 8256 (2025)

Superconductivity has fascinated scientists for over a century. Raising the superconducting critical temperature is essential for real-world applications, from magnetic resonance imaging to quantum technologies. Yet a key question remains: how high can the superconducting temperature really go at ambient pressure?

In a recent study focused on conventional superconductors, researchers at the Centro de Física de Materiales (CFM-MPC) address this question using a combination of first-principles calculations and machine learning. Rather than focusing on a few selected materials, researchers explored conventional superconductivity on an unprecedented scale by screening 100 million compounds. This data-driven approach allows researchers to move beyond individual discoveries and identify the fundamental principles that govern superconductivity.

At the heart of conventional superconductivity lies the interaction between electrons and vibrations of the atomic lattice, known as phonons. Intuitively, one might expect that strengthening the interaction between phonons and electrons would lead to higher superconducting temperatures. However, their results reveal a fundamental constraint: these two ingredients cannot be optimized simultaneously. Materials with very high vibrational frequencies tend to have weak electron–phonon coupling in most cases. This intrinsic trade-off acts as a bottleneck, limiting how far superconductivity can be pushed.

By systematically analyzing this balance across 20,000 metals using ab initio calculations, researchers find that the maximum achievable superconducting temperature at ambient pressure is likely around 100~120 K. Some hydrogen-rich compounds come close to this limit in theory, with predicted transition temperatures above that of liquid nitrogen. However, these promising candidates come with a major caveat: they are typically thermodynamically unstable, making them extremely difficult to synthesize and maintain under normal conditions.

This insight helps explain a long-standing puzzle. While record-breaking superconductors have been discovered at high temperatures, they always require extreme pressures. These results suggest that, under ambient pressure, conventional superconductivity faces a much stricter ceiling. Although fundamental physical laws do not strictly forbid room-temperature superconductivity, achieving it at ambient pressure through conventional electron-phonon mechanisms appears highly unlikely in practice. This work provides a clearer roadmap for future research, pointing toward the need for new materials, unconventional mechanisms, or entirely different physical paradigms.

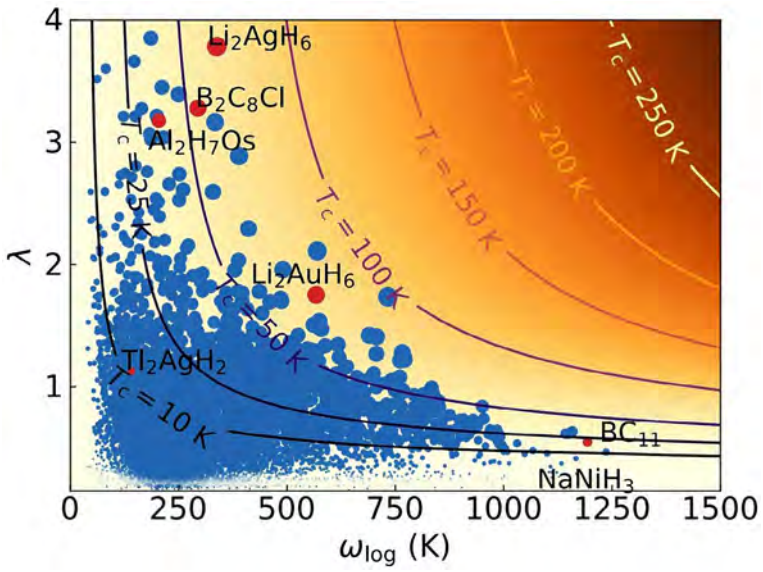


Figure: *Trade-off between electron phonon coupling λ and logarithmic average frequency ω_{log}*

* Original publication title: The maximum Tc of conventional superconductors at ambient pressure

HIGHLIGHT 10

Long-lived zone-boundary magnons in an antiferromagnet

Choe J, Lujan D, Ye G, Nnokwe C, Ma B, He J, Gao F, Nunley N, Leonardo A, ***Arruabarrena M****,* ***Ayuela A****, Zhou J, Rodriguez-Vega M, Fiete G, He R, and Li X.*

Nature Communications 16, 5486 (2025)

Antiferromagnetic (AFM) insulators exhibit many desirable features for spintronic applications such as fast dynamics in the THz range and robustness to fluctuating external fields. However, large damping typically associated with THz magnons presents a serious challenge for THz magnonic applications.

Here, we report long-lived short-wavelength zone boundary magnons in the honeycomb AFM insulator CoTiO3, recently found to host topological magnons. We find that its zone-boundary THz magnons exhibit longer lifetimes than its zone-center magnons. This unusual momentum-dependent long magnon lifetime originates from several factors including the antiferromagnetic order, exchange anisotropy, a finite magnon gap, and magnon band dispersion. Our work suggests that magnon-magnon interaction may not be detrimental to magnon lifetimes and should be included in future searches for topological magnons.

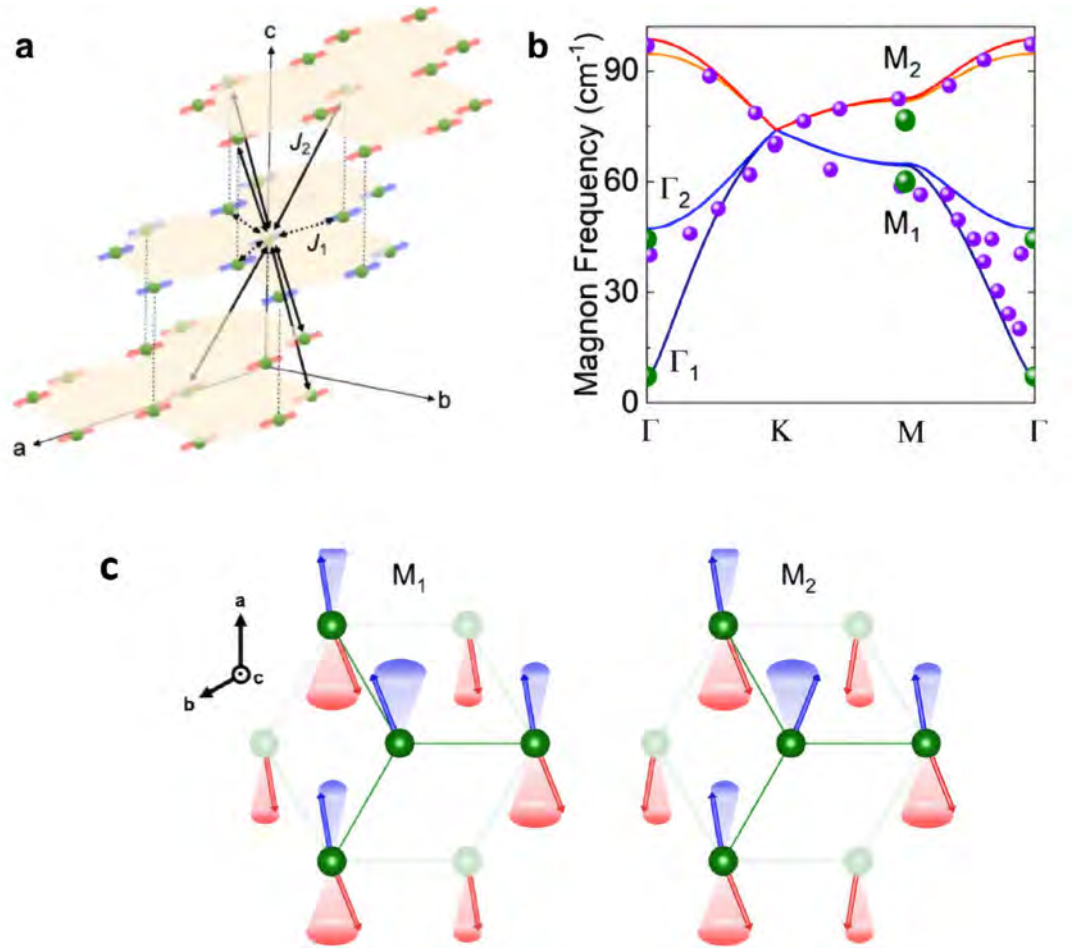


Figure: *Magnons in CoTiO3. a Spin lattice structure of the buckled honeycomb of Co2+ ions in the AFM phase. The spins are ordered ferromagnetically (anti-ferromagnetically) between intralayer (interlayer) spins coupled by the exchange interaction J1 (J2). b Calculated magnon dispersion (color solid lines) along the lines of Γ-K-M-Γ in the Brillouin zone. The green and purple dots are experimental data from our Raman measurements and inelastic neutron scattering, respectively. c boundary labeled with high symmetry points. c Schematic of magnon precession for M1 and M 2 modes involving two adjacent honeycomb lattices in the ab plane. Atoms in the top (bottom) layer are represented by dark (light) green balls and the arrows describe the phases of the precession. Three atoms (with both blue and red cones) in the two layers overlap in this top view along the c-axis.*

HIGHLIGHT 11

A "cool" modern roman concrete with radiative cooling functionality*

***Dolado J**, **Goracci G**, Moutaoukil G, Agbaoye R, Beruete M, Torres-García A, Carlosena L, Prabhu A, Ibáñez JA, Adams N, Van Lipzig N, and Allacker K.*

Advanced Science 18, e11691 (2025)

In recent decades, the combined impact of human activity on our planet has led to global warming, the rise of the Urban Heat Island (UHI) effect, and a sharp increase in building energy costs for cooling.

An interdisciplinary research team led by Jorge S. Dolado (CFM) has developed a modern adaptation of Roman concrete with Daytime Radiative Cooling Capacity (DRCC). This innovative material, named COOLCRETE, demonstrates outstanding solar reflectance (>95%) and strong thermal emission within the atmospheric window (>91%)—comparable to the best state-of-the-art PDRC materials.

Field tests in the extreme desert climate of Tabernas (Almería) showed that COOLCRETE maintained surface temperatures between 2 °C and 10 °C below ambient levels during peak daylight hours. It also exhibited positive cooling powers of ~45 W/m² under solar irradiance of 850 W/m².

To complement these experimental results, the team developed predictive models that highlight COOLCRETE's significant environmental benefits. At the building scale, using COOLCRETE on roofs reduced cooling energy demand and CO emissions so effectively that air conditioning could become unnecessary in hot climates.

Beyond individual buildings, COOLCRETE offers a practical large-scale solution to mitigate the Urban Heat Island effect. Mesoscale climate simulations reveal that coating city rooftops with COOLCRETE can substantially lower urban temperatures. For example, during the severe Brussels heatwave of August 2019, citywide application of COOLCRETE could have reduced daytime temperatures by up to 10 °C and nighttime temperatures by 5 °C.

Figure: *An artistic depiction of the Colosseum—a symbol of Roman engineering—reimagined within an overheated urban landscape. The image serves as a visual metaphor for 'Coolcrete,' a modern concrete inspired by Roman innovation, designed with daytime radiative cooling properties. By lowering surface temperatures and reducing cooling energy demand, Coolcrete presents a powerful opportunity for energy savings and offers a promising solution to mitigate the Urban Heat Island effect.*

* Original publication title: A Modern Roman-Inspired Concrete with Daytime Radiative Cooling Capacity

HIGHLIGHT 12

Single-bond dual dynamics: temperature-gated associative and dissociative exchange of disulfides in a sustainable covalent adaptable network

Guerrero-Ruiz F, Otaegi I, ***Verde-Sesto E****, and* ***Maiz J****.*

Chemical Engineering Journal 525, 170122 (2025)

Developing recyclable polymer networks that combine durability with sustainability remains a central challenge in materials science. In a recent article in Chemical Engineering Journal, researchers at the Materials Physics Center (CFM-MPC) demonstrate that a single disulfide bond can exhibit two distinct exchange mechanisms, associative and dissociative, controlled exclusively by temperature, in a sustainable covalent adaptable network (CAN) without additives or complex formulations.

Thermoset polymers are widely used in industry due to their mechanical robustness, but their inability to be reprocessed or recycled poses significant environmental challenges. CANs address this limitation by incorporating reversible covalent bonds, enabling reprocessability while maintaining structural integrity. Among these, disulfide bonds stand out for their responsiveness and availability, though controlling multiple exchange pathways within a single bond type remains difficult.

Here, the team synthesized a disulfide-based CAN via a green, scalable oxidation process using a low-cost commercial monomer. Combining mechanical, thermal, and spectroscopic techniques, including dynamic mechanical analysis, stress relaxation, creep testing, broadband dielectric spectroscopy, and Raman and FTIR spectroscopy, they reveal two clearly separated and reversible dynamic regimes. Below 365 K, the network undergoes associative disulfide metathesis, preserving cross-link density. At higher temperatures, thermal S-S bond cleavage dominates, leading to a dissociative mechanism. This temperature-gated duality translates directly into material performance: the network self-heals at room temperature under mild pressure, can be fully mechanically recycled at 393 K with recovery of its original viscoelastic and tensile properties, and remains stable under air, light, and humidity.

This work demonstrates that minimal molecular design can deliver sophisticated dynamic behavior, highlighting the ability of CFM-MPC researchers to bridge polymer physics, dynamic covalent chemistry, and sustainable materials design.

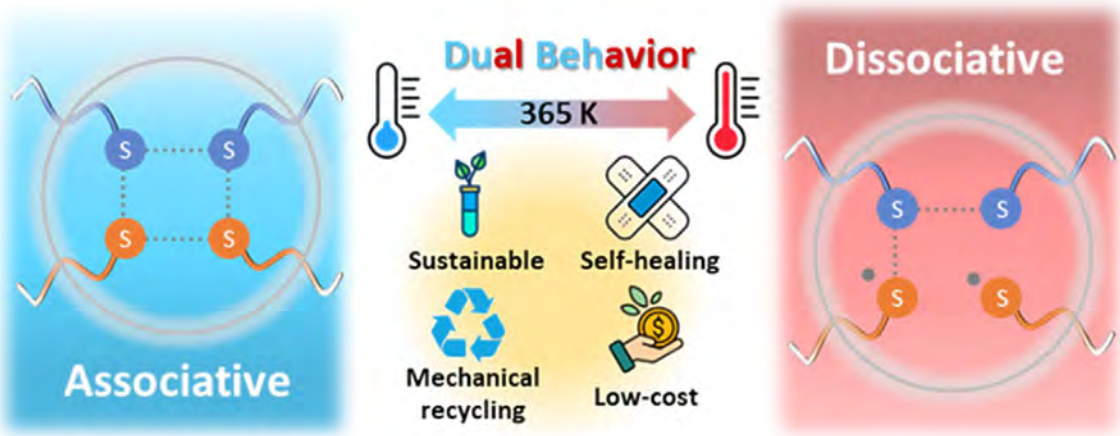


Figure: *Disulfide-based covalent adaptable network (CAN) showing temperature-gated dual dynamics: associative exchange below 365 K and dissociative above. This single-bond system enables room-temperature self-healing and full recyclability, using a sustainable, low-cost monomer.*

HIGHLIGHT 13

Accelerated design of gold nanoparticles with enhanced plasmonic performance

Montaño-Priede JL, Rao A, ***Sánchez-Iglesias A****, and* ***Grzelczak M****.*

Science Advances 11, eadx2299 (2025)

Finding the best structural parameters of gold nanoparticles for targeted applications is a resource-intensive and non-trivial task, even for experienced researchers. AI is becoming an emerging tool capable of accelerating the optimization process of nanomaterials.

In a conventional workflow, one uses the so-called forward design (or trial-and-error processes) in which the manual adjustment of nanoparticle structure is verified by numerical evaluation to assess their performance for targeted applications. An interdisciplinary research team at CFM, led by Marek Grzelczak, has developed a workflow in which a global optimization algorithm (Bayesian Optimization) orchestrates electrodynamic simulations to find the optimal structure of nanoparticles. In this inverse design approach, the plasmonic performance is the objective the algorithm seeks to maximize through a sequential learning and optimization process as it traverses across the multidimensional parameter space (Figure). By using gold bipyramids as a model system, the researchers demonstrated that the self-driving workflow can propose optimal nanoparticle dimensions, resulting in enhanced performance in photothermal heating, SERS, photoluminescence enhancement, strong plexcitonic coupling, and colorimetric sensing. The inverse design workflow has been found to accelerate the canonical forward design by a factor of two orders of magnitude.

The appealing feature of the algorithm is its capability for multi-objective optimization – finding a structural trade-off to balance between antagonistic performances. The researchers could find dimensions of gold bipyramids that maximize photoluminescence enhancement of an emitter while minimizing heat generation. The excessive local heat generation by gold nanoparticles can compromise the photoluminescence of the emitter, holding back the development of devices.

Although used for the design of individual nanoparticles, the workflow is expected to handle equally well the design of large multiparticle systems, thereby informing experimentalists with optimal design rules for targeted applications.

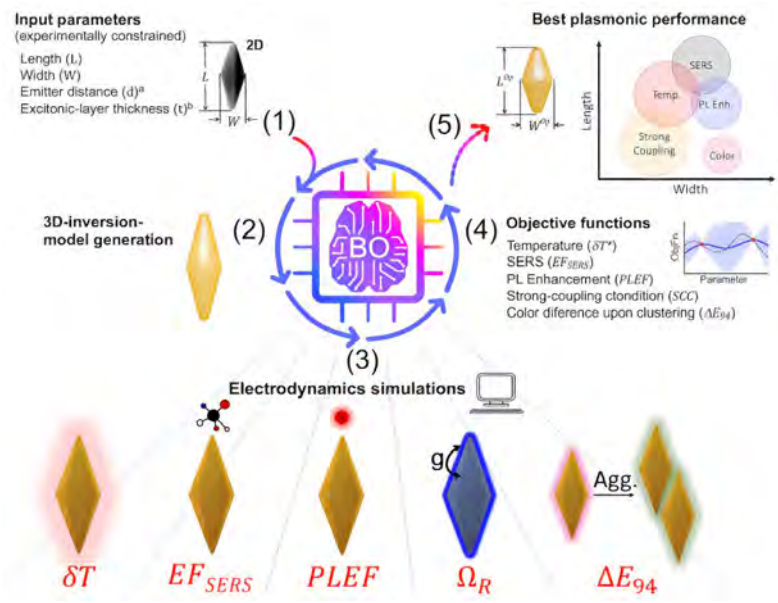


Figure: *The autonomous workflow suggests structural parameters for gold bipyramids with maximized plasmonic performance in photo-to-thermal heating, SERS, photoluminescence enhancement of an emitter, strong plexcitonic coupling, and color transition upon clustering.*

HIGHLIGHT 14

Doped perovskite quantum dots as a single-photon sources with enhanced stability*

Ryu J, ***Krivenkov V***, ***Olejniczak A***, *Arruabarrena M, Janovec J, Hadjadj S, Ilyn M, Leonardo A, Martínez-Martínez V,* ***Ayuela A***, *Nikitin A, and* ***Rakovich Y***.

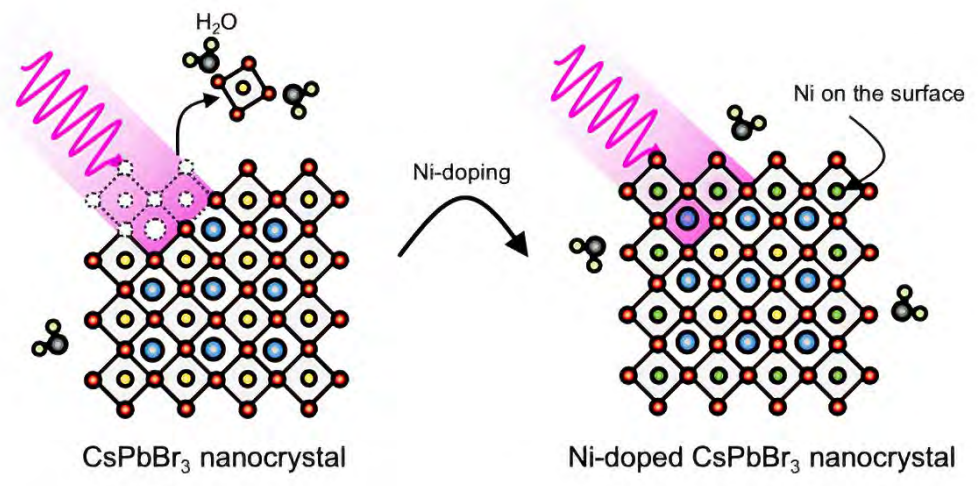
Nano Letters 25, 16630 (2025)

We have unveiled a simple yet powerful way to greatly enhance the stability of perovskite quantum dots – tiny light-emitting nanocrystals poised to play an important role in next-generation quantum communication and computing. The advance could accelerate the transition from expensive, epitaxially-grown materials to affordable, solution-processed components suitable for real-world quantum technologies.

The team discovered that introducing just a trace amount of nickel during a rapid, room-temperature synthesis produces $CsPbBr_3$ quantum dots that remain remarkably stable under everyday environmental conditions and stressors. This simple chemical adjustment allows the nanocrystal quantum dots to maintain bright, clean optical emission without degrading or blinking, even at normal humidity levels.

Notably, the nickel-doped quantum dots act as high-quality single-photon sources, emitting one photon at a time with exceptionally high purity. This level of performance is rarely achieved under ambient conditions, and it marks a key step toward building robust quantum-optical systems.

By combining stability, scalability, and excellent quantum-emission quality, the work demonstrates a practical and cost-effective route to quantum light sources. The findings open new possibilities for integrating perovskite nanomaterials into quantum communication hardware, photonic chips, and compact sensing technologies – bringing the vision of accessible quantum devices one step closer to reality.



* Original publication title: Nickel Doping Unlocks Ambient-Condition Photostability in Individual Cesium Lead Bromide Perovskite Quantum Dots

HIGHLIGHT 15

Overcoming symmetry limits in photovoltaics through surface engineering*

Sivianes J, Garcia-Goiricelaya P, Hernangómez-Pérez D, and ***Ibañez-Azpiroz J****.*

Physical Review Letters 135, 256201 (2025)

A recent study published in Physical Review Letters and carried out by researchers from EHU, nanoGUNE, DIPC and CFM introduces a groundbreaking approach to solar energy conversion and spintronics. The work tackles a long-standing limitation in the bulk photovoltaic effect—the need for non-centrosymmetric crystals—by demonstrating that even perfectly symmetric materials can generate significant photocurrents through engineered surface electronic states. This discovery opens new pathways for designing efficient light-to-electricity conversion systems and ultrafast spintronic devices.

Conventional solar cells rely on carefully engineered interfaces, such as p–n junctions, to turn light into electricity. A more exotic mechanism—the bulk photovoltaic effect—can generate electrical current directly in a material without such junctions, but only if its crystal structure lacks inversion symmetry. This strict requirement has long restricted the search for practical materials. In this new study, a group of researchers demonstrates that this limitation can be overcome: even perfectly symmetric materials can produce sizeable photocurrents thanks to the special electronic states that naturally form at their surfaces.

Using first-principles calculations, the authors show that the surfaces of metals and semiconductors with strong relativistic spin–orbit interaction can host electronic states that behave very differently from those in the bulk. These surface states break inversion symmetry locally and respond nonlinearly to light, giving rise to robust charge currents and, remarkably, pure spin-polarized currents flowing along the surface. After benchmarking the mechanism on the well-known Au(111) surface, they identified Tl/Si(111) as an ideal material platform, predicting photocurrents comparable to those of leading ferroelectrics along with clear experimental signatures for detection.

The findings reveal a new strategy for light-to-electricity conversion: rather than searching for complex non-centrosymmetric crystals, scientists can "engineer" photocurrents by tailoring the surface electronic structure of otherwise symmetric materials. Beyond energy harvesting, the ability to generate and control spin currents with light—without magnets or applied voltages—opens promising opportunities for ultrafast, low-power spintronic devices.

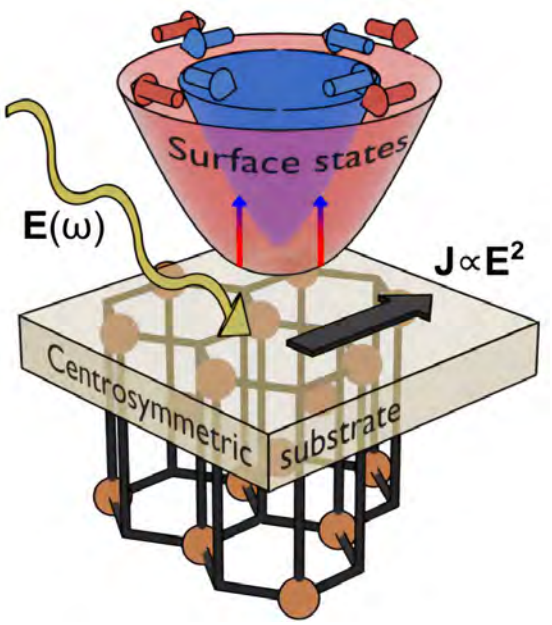


Figure: *Schematic illustration of quadratic photocurrents in centrosymmetric materials generated by Rashba surface states.*

* Original publication title: Surface-State Engineering for Generation of Nonlinear Charge and Spin Photocurrents

SCIENTIFIC EVENTS ORGANIZED BY CFM

14
International meetings

9
Quantum Breakfast & Friends encounters

8
CFM Colloquium Series

16
PhD Seminars

5
Neutron Scattering Series

NEW in 2025

60
Invited and plenary talks
at international meetings by CFM researchers

In 2025 CFM actively organized conferences, workshops, and seminars to foster the exchange of knowledge, present cutting-edge research results, and stimulate collaboration. These events bring leading international experts together, creating a dynamic forum where scientists engage with new ideas, strengthen networks, and advance the frontiers of materials physics and related disciplines.

In addition to the international set of events, the CFM hosts regular seminars for the local community. These include the Quantum Breakfast lecture series, the CFM colloquium series, and the PhD Seminars series. On top of this offer, The Neutron Scattering series kicked off in 2025 with 5 talks given by internationally renowned researchers.

Moreover, CFM researchers attended requests to give more than 60 invited and plenary talks in international conferences, showing their leadership in their respective fields.

INTERNATIONAL CONFERENCES

3S'25 Symposium on Surface Science

Organizers: Andrés Arnau Pino (CFM-EHU), Daniel Sánchez Portal (CFM-CSIC), Enrique Ortega Conejero (CFM-EHU), Julen Ibañez Azpiroz (CFM), Olatz Leis Esnaola (DIPC), and Pedro M. Echenique Landiríbar (DIPC)

Hotel Tuc blanc, Baqueira Beret

March 9-15, 2025

World Conference on Gold 2025

Organizers: Luis Liz-Marzán (CIC biomaGUNE - BRTA), Javier Aizpurua (DIPC), Rubén Esteban Llorente (CFM-CSIC), M. Concepción Gimeno Floría (CSIC-Universidad de Zaragoza), Marek Grzelczak (CFM-CSIC), Dorleta Jiménez de Aberasturi (CIC biomaGUNE), Aitziber López Cortajarena (CIC biomaGUNE -BRTA), and Leonardo Scarabelli (Universidad de Cantabria)

Kursaal Convention Center, Donostia / San Sebastián

May 11-14, 2025

Current Trends in Nonlinear Photocurrents and Magnetism (CINERAMA25)

Organizers: María Camarasa Gómez (CFM), Daniel Hernangómez Pérez (CIC nanoGUNE), and Julen Ibañez Azpiroz (CFM)

CFM, Donostia / San Sebastián

May 26-30, 2025

Donostia is Science

Organizers: CIDETEC, DIPC, POLYMAT, and CFM

Donostia / San Sebastián

May 28-30, 2025

PWF Sudan: Expanding Physics Horizons in Sudan (Leveraging Online Seminars for Growth)

Organizers: Alaa Mohammed Idris Bakhit (CFM), and Dr. Abubakr Y. A. Ibrahim (Institute of Space Sciences -ICE, and Universidad Autónoma de Barcelona)

Online

June 2-July 25, 2025

QTYR25, the Quantum Technologies for Young Researchers

Organizers: PhD and Young Scientists in Quantum Technologies Network (PYSQT) - Local organizer Ángel Rodríguez Alcaraz (CFM)

Institute of Physical Chemistry Blas Cabrera, Madrid

July 8-11, 2025

Quantum Designer's Special Edition: 100 years of Quantum (QD100)

Organizers: Daniel Loss (University of Basel), Francisco Guinea (IMDEA Nanoscience, and DIPC), Roman Lutchyn (Microsoft Azure Quantum, Santa Barbara), Jelena Klinovaja (University of Basel), and Vitaly Golovach (CFM-DIPC-Ikerbasque)

Miramar Palace, Donostia / San Sebastián

July 14-18, 2025

30th International Conference on Low Temperature Physics (LT30)

Organizers: Hermann Suderow (Chair, UAM), Fernando Luis (Vice-Chair, INMA), and F. Sebastian Bergeret Sbarbaro (Vice-Chair, CFM-CSIC-DIPC)

Bilbao Exhibition Centre

August 7-13, 2025

ECOSS 38-Defects in 2D Materials and Interfaces: Quantum Challenges in their Nanoelectronics, Magnetic and Optic Functionalities

Organizers: Lucia Vitali (CFM-Ikerbasque), and Andrés Ayuela Fernández (CFM-CSIC)

Braga

August 27-29, 2025

MESTIZAJES: V Encuentro Internacional sobre Literatura y Ciencia - Cartografiando la Cultura. Enredando Ciencias y Humanidades.

Organizers: Gustavo Ariel Schwartz (CFM-CSIC), Silvina Cerveny Murcia (CFM-CSIC), Aitzol García Etxarri (DIPC, Ikerbasque)

Donostia International Physics Center (DIPC) / CFM

October 5-6, 2025

Qiskit Fall Fest 2025 + Hackathon

Organizers: BasqueQ

Facultad de Informática de EHU, Donostia

November 5-6, 2025

INTERNATIONAL WORKSHOPS

22nd International Workshop on Computational Physics and Materials Science: Total Energy and Force Methods

Organizer: Ion Errea Lope (CFM-EHU)

ICTP, Trieste

January 8-10, 2025

On-Surface Synthesis of Low -dimensional Carbon.-based Nanomaterials (FisMat2025 conference)

Organizers: Marco di Giovannatonio (Institute of Structure of Matter -ISM), Martina Corso (CFM-CSIC), and Francesco Sedona (University of Padua)

Venice

July 7-11, 2025

BasQ Practitioner Workshop

Organizer: Ángel Rodríguez Alcaraz (CFM)

Miramar Palace, Donostia / San Sebastián

September 12, 2025

QUANTUM BREAKFAST

Starting in 2021, and promoted by CFM researcher Miguel Varga, "The Quantum Breakfast seminar series" intended to be educational in a relaxed atmosphere. They are a great opportunity to gain insight in quantum technologies, as well as to bring together the local community.

FEBRUARY 21

Modelling optical traps through multipolar decomposition

Iker Gomez-Viloria

CFM

Tensor network simulation of 2D spin liquid candidates: A study of the maple-leaf lattice

Jan Naumann

PhD Student, Freie Universität Berlin

JUNE 13

Excitonic landscapes: TD-DFT in action in the realm of van der Waals materials

María Camarasa Gómez

CFM

Excitonic landscapes: GW-BSE and application to heterobilayers and many-body magneto-optics

Daniel Hernangomez Pérez

CIC nanoGUNE

SEPTEMBER 26

Perovskite Nanocrystals as Single-Photon Sources

Jehyeok Ryu

CFM

Moiré Polaritonic Fourier Engineering

Victor Sierka

DIPC

NOVEMBER 28

Quantum Simulation of Discrete Time Crystals on NISQ Devices

Ángel Rodríguez Alcaraz

CFM

Fermionic-Bosonic Superconducting Circuit

Jon Ortuzar Andrés

CFM

Control of parity and supercurrents in small Pb superconducting islands

Stefano Trivini

CIC nanoGUNE

CFM COLLOQUIUM SERIES

Starting in 2024, the CFM colloquium series target not only at specialists working on similar topics but also at a broader audience of researchers. Each talk held in the CFM Auditorium follows a "Meet the Speaker" session with coffee and cookies, with immense opportunities to discuss in a distended atmosphere. To this end, an expert is invited to give a pedagogical talk about a topic of current interest in each session.

FEBRUARY 3	MARCH 17	APRIL 10	MAY 8
Topological phases in polar oxide nanostructures Javier Junquera (Facultad de Ciencias - Universidad de Cantabria)	**Simulating Quantum Matter with Ultracold Atoms** Michele Modugno (Ikerbasque - EHU)	**From Supersonic Expansions to Atmospheric Particles: Bridging the Gap Between Early Nucleation Stages and Aerosols** Maider Parra Spectroscopy Group (EHU, Leioa)	**Practical Introduction to NISQ Computing with IBM Machines** Nicolás Lorente Palacios (CFM-CSIC)
MAY 13	**JUNE 26**	**JULY 7**	**OCTOBER 20**
Polarized Neutron Reflectometry (PNR): Principles and Applications Ricardo López Anton (IRICA and Department of Physics, University of Castilla-La Mancha)	**1D pi-conjugated polymers: topological phase transition and suppression of Peierls instabilities** Pavel Jelinek (Institute of Physics of the Czech Acadamy of Sciences)	**Probing quantum geometry with optics** Margarida Telo da Gama (Centro de Física Teórica e Computacional, Faculdade de Ciências, Universidade de Lisboa)	**Momentum-space topology and quantum geometry of graphite** Prof. Tero Heikkilä (University of Jyväskylä, Finland)

PHD SEMINAR SERIES

The PhD Seminar Series aims to foster a vibrant research community by providing PhD students a platform to share their research progress, exchange ideas, and receive constructive feedback from peers and experts. It is designed to bring together the scientific community of CFM, DIPC, and CIC nanoGUNE.

JANUARY 15

Fluorescence of a single molecule attached to a Scanning Tunnelling Microscope (STM) picocavity

Xabier Arrieta Aristi

Exploring Light Emission in current-driven STM-junctions: From Weak to Strong Coupling Regimes

Andrés Bejarano

FEBRUARY 2

High-intensity wave vortices around subwavelength holes: from ocean tides to nanooptics

Kateryna Domina

CDW, quantum materials, Kagome lattice

David Subires Santana

MARCH 5

Quasiparticle interference in twisted bilayer graphene

Nguyen Duy Hoang Minh

Growth and characterization of graphene nanostructures for sensing applications

Paula Angulo Portugal

MARCH 26

Schwinger Mechanism in Spin-Qubits in Quantum Dots

Javier Oliva del Moral

Polaritons in anisotropic van der Waals crystals

Kirill Voronin

APRIL 9

Topology in 5 armchair graphene nanoribbon

Daniel García Pina

Ab initio insights into the electronic properties of 1D and 2D carbon-based nanoarchitectures

Martin Irizar Landa

APRIL 30

Topological lattice vibrations with long-range interactions

Francesc Ballester

Thermoplasmonics with Gold Nanoparticles: From Photothermal Performance to Silver Photoreduction

Mohan Naik

MAY 14

Topological magnetic Moiré heterostructures

Aymeric Saunot

Atomic phase diagram of CsV3Sb5 Kagome metal

Manex Alkorta Lopetegui

JUNE 11

Water remediation and water dynamic

Francesco Coin

New metabolic modulators based on organometallic Iron intracellular catalysts

Esteban Zingales

NEUTRON SCATTERING SERIES

NEW in 2025

The Neutron Scattering Series is an invited seminar program organized at the CFM to promote the use of neutron-based techniques across a broad range of scientific disciplines. The series brings together leading researchers and instrument scientists to showcase the capabilities of neutron scattering for the investigation of materials at the nanoscale, including soft matter, magnetic materials, biological systems, and energy-related materials. Through presentations on both state-of-the-art instrumentation and cutting-edge scientific applications, the series aims to increase awareness of the opportunities offered by neutron facilities, provide an overview of recent developments in neutron science, and foster discussion, collaboration, and exchange of expertise within the research community.

JUNE 24	JULY 18	SEPTEMBER 9
ESS Bilbao. Developments in Neutron Science and Technology Mario Pérez (ESS Bilbao) CFM Auditorium	**Mechanism(s) of antimicrobial peptides: what can we learn from x-ray & neutron scattering techniques?** Professor Reidar Lund (University of Oslo) CFM Auditorium	**Neutron Scattering to Study Magnetic Materials** José María Porro (BCMaterials, Ikerbasque, and Ramon Cajal Research Fellow) Josebe Olarra Auditorium (DIPC)
OCTOBER 29	**NOVEMBER 19**	
The role of simulations in the construction of the European Spallation Source Damian Rodriguez (European Spallation Source (ESS) CFM Auditorium	**The JCNS Deuteration Service** Kuno Schwärzer (Staff scientist at the Jülich Centre for Neutron Science) CFM Auditorium	

MORE INVITED SPEAKERS

FEBRUARY 18

Current Trends in High Pressure Superhydride Research/Ultrastable Polyhydrides and Radio-frequency Method of Detection of Superconductivity in Them

Dmitrii Semenok and Di Zhou (HPSTAR, Beijing, China)

FEBRUARY 21

Plasmon-phonon hybridization in doped semiconductors and phonon linewidths due to phonon-dressed-electron coupling

Cheol-Hwan Park (Seoul National University)

MARCH 12

IESMAT seminar and practical session

Álvaro Núñez García and Pablo Palomino (IESMAT)

APRIL 4

Academy, Industry, & Editorial: Some tips from my journey

Jhoan Toro-Mendoza (American Chemical Society Publications. Oxford, UK.)

MAY 22

Mondragon Unibertsitatea: Bridging Science and Industry Through Education

Jon Lasa Alonso (Mondragon Unibertsitatea)

JUNE 10

Mechanochromic Polymers based on Supramolecular Mechanophores

Prof. Christoph Weder (Adolphe Merkle Institute (AMI) of the University of Fribourg)

JUNE 30

Graphene nanoribbons: From gas sensors and molecular memories to bio and quantu

Alexander Sinitskii (University of Nebraska, Lincoln, USA)

JULY 7

Realistic Model Catalysts: Complex Materials for Atomic-Level Insights

Pablo Beato (Lead Scientist, TOPSOE A/S)

JULY 9

Hyper-Crosslinked Polymers (HCPs) Tour: From Design to Advanced Applications

Eva M Maya (ICMM-CSIC)

JULY 18

Colloidal Synthesis of 2D Material Hybrids and Emerging Techniques for Optical Patterning of Functional Materials at Interfaces

Eric Hill (Ikerbasque)

SEPTEMBER 11

From ultrahigh magnetic fields to interface engineering: a multiscale modelling paradigm for nanomaterials in extreme environments

Karolina Zofia Milowska (CIC nanoGUNE)

SEPTEMBER 17

JOSEPHINE SEMINAR SERIES

Superconducting Spintronics for Racetrack Memory

Stuart Parkin (Max Planck Institute of Microstructure Physics (Halle, Germany)

SEPTEMBER 24

Bridging Scales in Energy Storage through Atomistic Simulations

Dr. Haouas Hayat (Laboratory of Inorganic Materials for Sustainable Energy Technology (LIMSET)

SEPTEMBER 26

Optical improvements and energy-yield calculations of solar cells

Klaus Jäeger (Helmholtz-Zentrum Berlin)

RESEARCH PROJECTS

102
Ongoing Projects

1
Spin Off

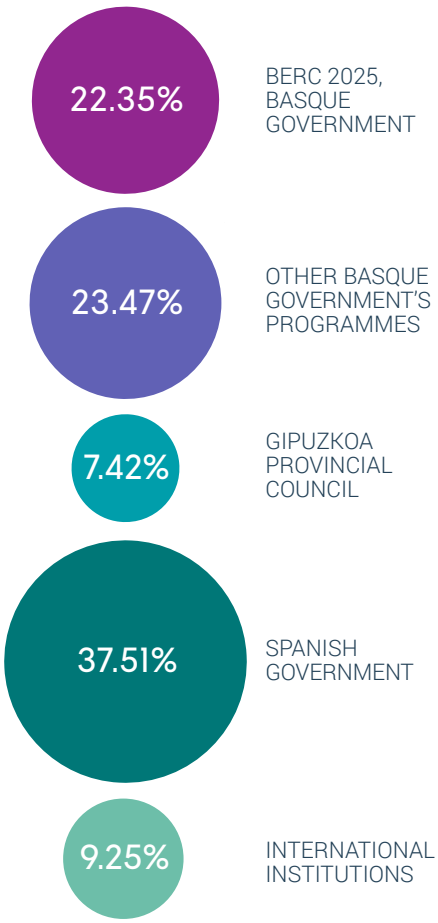
Participation in a wide range of research projects is of vital importance to the centre's scientific activity. Researchers are very active in submitting applications for funding from local, regional, national and international funding agencies, which also provides a unique opportunity to align the center's research with major global transitions. In particular, participation in collaborative projects is essential for establishing competitive networks that can effectively address current and future challenges in advanced materials science in a synergistic way, and help tackle them through a cross-sectoral, international and interdisciplinary approach.

PUBLIC FUNDING OBTAINED IN 2025 FOR RESEARCH PROJECTS

Regarding public funds for research activity, the center obtained more than 6 million euros in 2025, including funds provided by the Basque Government in the framework of the IKUR strategy and BERC contribution for 2025.

6 127 282 €

TOTAL PUBLIC RESEARCH FUNDS OBTAINED IN 2025



IKUR and BasQ in 2025

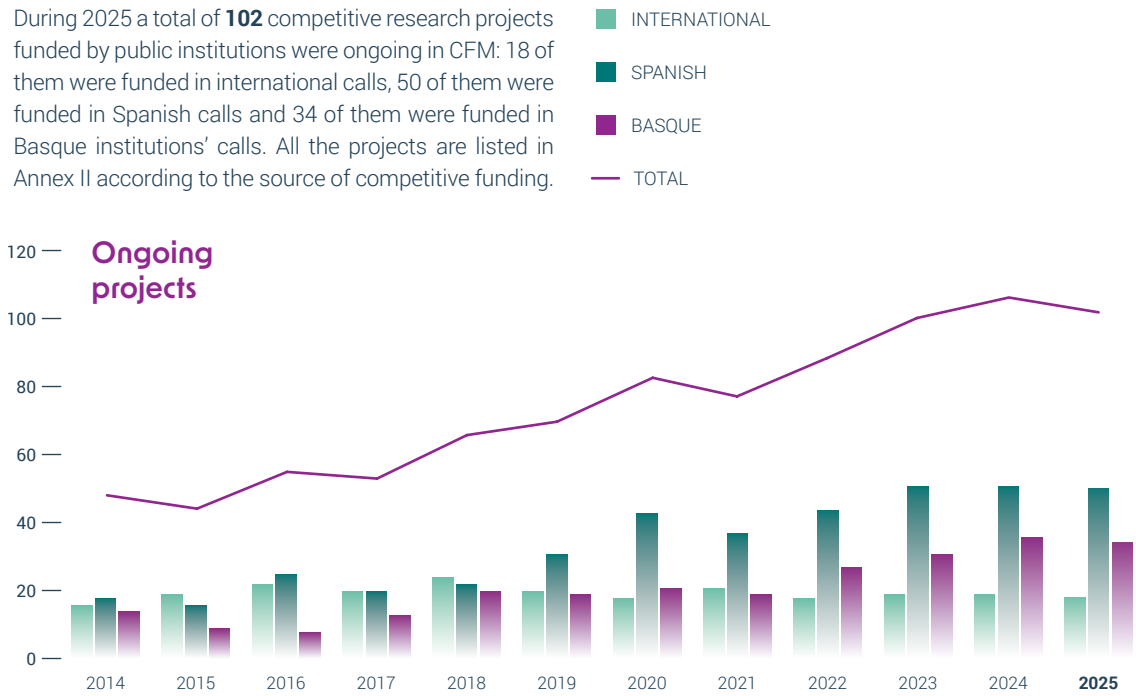
In 2025 our center was involved in several projects funded by Basque Government's IKUR strategy. These projects fell within the four specific areas of IKUR (Quantum Technologies, Neutrionics, HPC-AI and Neurobiosciences) and received total funding of 726.407 euros in 2025, which enabled recruiting highly specialised staff, acquiring scientific equipment and carrying out experimental campaigns at leading international facilities. Regarding BasQ initiative, which aims to establish the Basque Country as a leading international hub for research in the field of quantum technologies, CFM participated in two projects in 2025, receiving funding of around 90.000 euros for staff recruitment and other research activities. Both IKUR and BasQ initiatives are launched by Basque Government's Department of Science, Universities and Innovation.

Euskampus LTCs in 2025

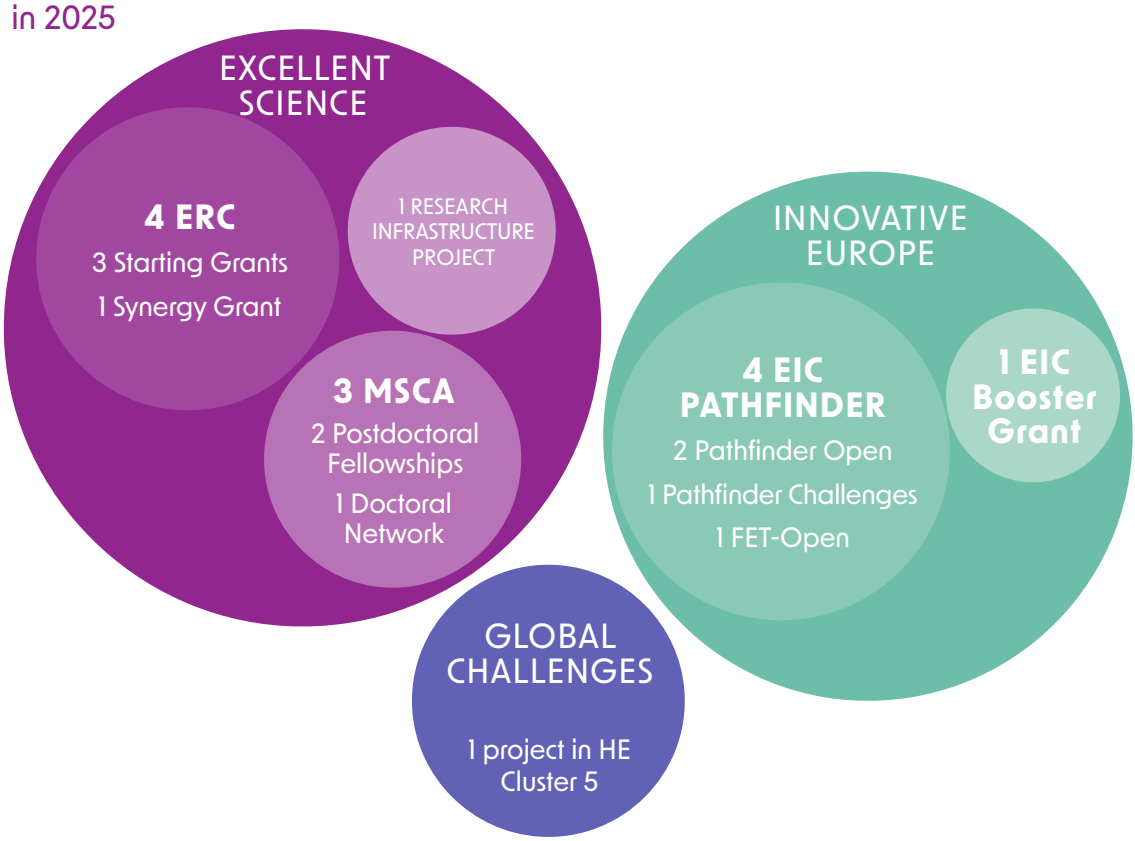
CFM participates or co-leads three Laboratories for Trans-border Cooperation (LTCs) within the Euskampus–Bordeaux Campus of Excellence: (1) **QuantumChemPhys**, focused on theoretical chemistry and physics at the quantum scale; (2) **Green Concrete**, devoted to sustainable concrete and cement-based materials; (3) **TransLight**, focused on the promotion of high-impact collaborative research in photonics. These initiatives demonstrate our commitment to shared infrastructure and sustained cross-border collaboration in areas closely aligned with regional strategic priorities. In 2025 our center received around 25.000 euros to continue supporting these long-term strategic activities.

ONGOING COMPETITIVE RESEARCH PROJECTS IN 2025

During 2025 a total of **102** competitive research projects funded by public institutions were ongoing in CFM: 18 of them were funded in international calls, 50 of them were funded in Spanish calls and 34 of them were funded in Basque institutions' calls. All the projects are listed in Annex II according to the source of competitive funding.



International projects funded under European framework programme ongoing in 2025



NOTABLE PROJECTS LAUNCHED IN 2025

C-SINC - Concrete products through sustainable and innovative carbon-storing binders

(HORIZON-EIC-2024-PATHFINDERCHALLENGES-01, GA 101223135), 2025-2029, CFM PI: Maite Alducin Ochoa.

Collaborative Project

Coordinator: Paebbl AB (Sweden)

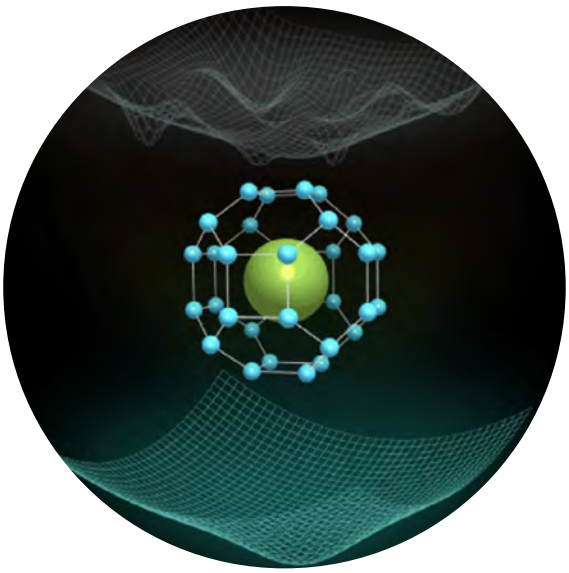
C-SINC
Concrete products through Sustainable and Innovative Carbon-storing binders

The cement industry is a major contributor to global carbon emissions due to its reliance on clinker, the main ingredient in traditional cement production. Within this context, the C-SINC project aims to address the urgent need for decarbonization in construction by developing an alternative binder that incorporates CO_2-sequestered magnesium-based silicates, such as olivine and pyroxenes, as supplementary cementitious materials (SCMs). This innovative approach replaces clinker and enhances concrete's carbon capture potential, transforming it into a carbon sink. The project will focus on optimizing the accelerated mineral carbonation process, refining the formulations and performance of these mineralized SCMs, and validating their suitability for large-scale industrial applications. The ultimate goal is to reduce concrete's embodied carbon emissions while maintaining or improving its structural performance.

NOTABLE PROJECTS COMPLETED IN 2025

Microspherical Superlens Windows to the Quantum World **(ONR Global basic and applied scientific research grant, N62909-22-1-2031), 2022-2025, PI: Yury Rakovich.**

The project developed microspherical superlens arrays enabling super-resolution imaging of nanostructures and quantum objects beyond the diffraction limit. Novel experimental results included high-resolution imaging of single nanowires and LEDs, enhanced plexciton systems, and controlled emission behaviors (e.g., single-photon to biphoton switching).



SuperH - Discovery and Characterization of Hydrogen-Based High-Temperature Superconductors (ERC-2018-STG, GA 802533), 2019-2025, PI: Ion Errea Lope.

The ERC SuperH project set out to uncover whether hydrogen-based materials could become **high-temperature superconductors at ambient pressure**, overcoming the current need for extreme conditions. To achieve this, the team developed **advanced first-principles theoretical methods** capable of accurately incorporating the strong quantum effects intrinsic to hydrogen, which standard approaches failed to capture. These new tools enabled the **identification and characterization of promising hydrogen-rich superconducting compounds**, clarifying when and why they reach high critical temperatures. Ultimately, SuperH delivered predictions of novel high-Tc superconductors synthesizable at moderate pressures accessible experimentally and metastable at ambient conditions.

MIRACLE - Photonic Metaconcrete with Infrared RAdiative Cooling capacity for Large Energy savings (FETOPEN-01-2018-2019-2020, GA 964450), IP: Jorge Sánchez Dolado.

Collaborative Project

Coordinator: CFM

MIRACLE has developed several concrete designs capable of daytime radiative cooling, consistently maintaining temperatures significantly below ambient levels even under direct sunlight. MIRACLE demonstrated that Photonic concretes can achieve substantial energy savings in buildings—up to 70% in cooling energy—and can significantly mitigate the Urban Heat Island Effect, with potential temperature reductions of up to 10°C during heatwaves. Additionally, their integration can lower solar cell operating temperatures by up to 20°C, improving efficiency and lifespan. The project has produced 35 scientific publications and received international recognition through conference awards, as well as organizing two international workshops involving key stakeholders. MIRACLE has also focused on market translation, participating in industrial fairs, securing two patents, and launching the spin-off PhotoKrete S.L. to accelerate the deployment of its patented PCMs.

TRANSFER OF KNOWLEDGE

Our center aims to promote activities designed to enhance the transfer of knowledge in its various forms. The portfolio of competitive research projects, R+D+I contracts and collaboration agreements involving both private companies and public institutions has been very productive in recent years and 2025 has followed the same trend.

Competitive projects in collaboration with private companies

For CFM, participating in public-private partnerships that apply for competitive funding for R&D&I projects is a priority, as a means of promoting knowledge transfer and increasing the impact of our research on society. In addition to Basque and Spanish calls, in the period 2020-2025 CFM has participated in seventeen (17) EU funded projects in collaboration with industrial partners.

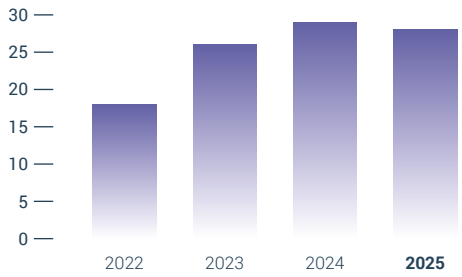
17 projects

Funded by the European Union

Agreements with private entities

Direct agreements signed between CFM and private companies for promoting public-private collaboration, including R+D+i contracts, framework agreements or agreements for joint initiatives, also provide a highly effective means of maximizing the contribution of our research to the current challenges in materials science sector, through the transfer of knowledge and cross-sector collaboration.

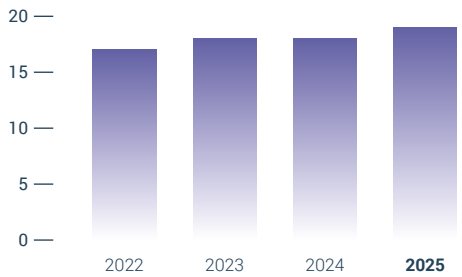
Evolution of the number of agreements with private entities in 2022-2025



Agreements with public institutions

Signing collaboration agreements with public institutions provides an opportunity to align our center's efforts with the strategic priorities of research policies at local, regional, national and international levels, thereby contributing with our expertise to addressing the three global transitions we currently face: the technological and digital transition, the energy and environmental transition, and the socio-demographic and health transition. This includes collaboration on outreach and educational activities, which are crucial for CFM in fulfilling its mission to help foster a future generation of highly qualified scientists, equitable and diverse, as the best way to ensure the pursuit of excellent science capable of tackling the new challenges that the future holds.

Evolution of the number of agreements with public institutions in 2022-2025



Protection of research results

Applying for patents is a way of protecting the results of research projects so that the pathway towards their practical application can be best designed, thereby optimizing the impact of our research on society. The growing number of patent applications (5 in 2025) is a clear indicator of the increasing importance of knowledge transfer in CFM.

11 patents requested in 2022-2025

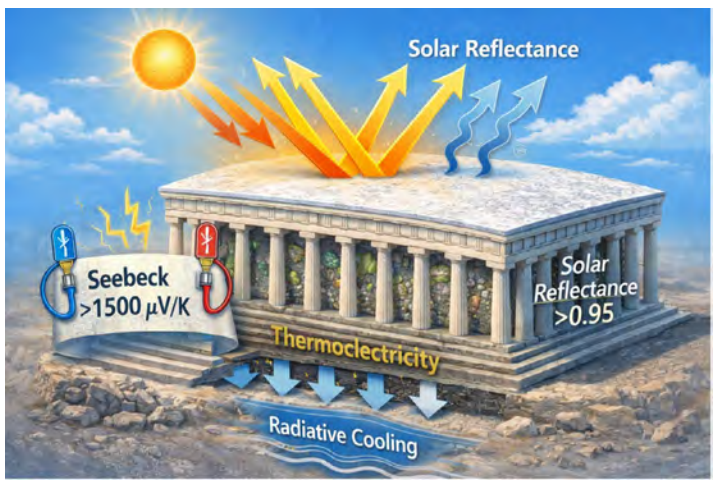
APPLIED PATENTS IN 2025

A cementitious composite with thermoelectric and radiative cooling properties

EP25382144.1

CFM inventors: Jorge S. Dolado, Guido Goracci, Mohamad Barzegar, Ghizlane Moutukil

A novel design of modern Roman concrete is presented, characterized by the simultaneous exhibition of thermoelectric and radiative cooling properties. In particular, the developed cementitious composite demonstrates an impressive Seebeck coefficient (greater than 1500 μV/K) and an exceptionally high solar reflectance (greater than 0.95), with both values inclusive.



Methods and compositions for the diagnosis and/or treatment of proteinopathies

Ref.: 911196

CFM inventors: Aitor Bergara Jauregi

The patent relates to methods and compositions for treating proteinopathies, particularly neurodegenerative proteinopathies such as ALS. These diseases are driven by the pathological spread of misfolded proteins—especially TDP-43—via a prion-like mechanism that sustains neuronal dysfunction and degeneration.

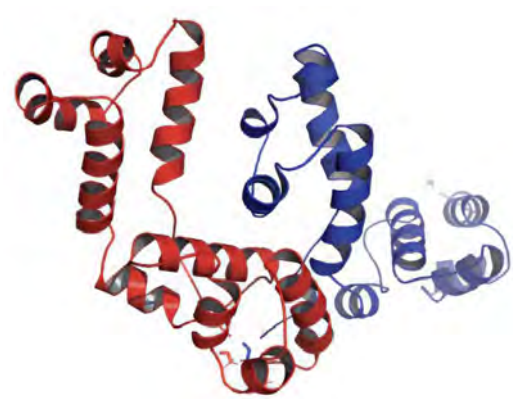


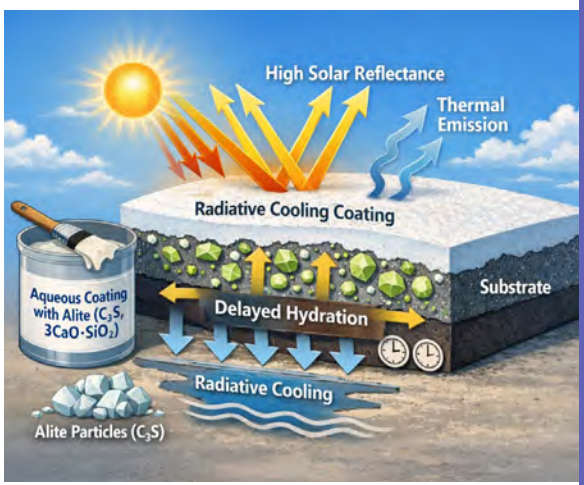
Figure: *Arc1 interactions with Lenacapavir*

Coatings comprising alite, with radiative cooling properties

Referencia: EP25382983

CFM inventors: Jorge S. Dolado, Guido Goracci

The invention relates to an aqueous coating composition with radiative cooling properties, which provides resulting coatings capable of radiative cooling. These coatings comprise an inorganic pigment containing alite (C_3S, $3CaO{\cdot}SiO_2$). The alite is incorporated into the aqueous coating formulation as a radiative cooling pigment, whose hydration is delayed or inhibited over extended periods. The coating exhibits high solar reflectance and thermal emissivity.



Device for optically exciting nanoparticles

EP25382827

CFM inventors: Marek Grzelczak

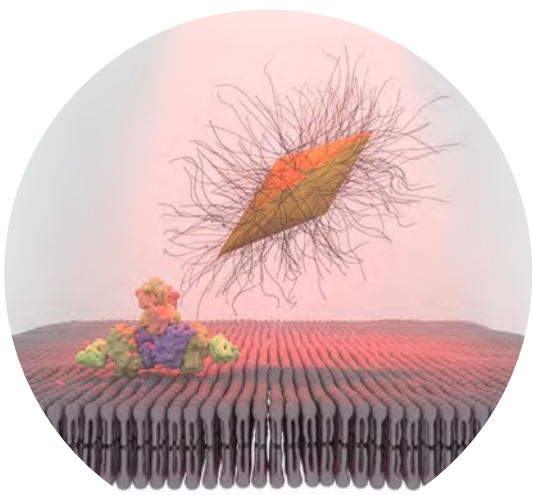
The patent protects a device capable of illuminating nanoparticles in order to selectively raise their temperature. The device is relevant for clinical use in brain procedures.

Functionalized nanoparticles for use in the treatment of cerebral ischemia

EP25383197.8

CFM inventors: Marek Grzelczak, Ana Sánchez Iglesias, Ane Escobar Fernández

The invention covered by the patent focuses on nanoparticles as therapeutic agents for treating brain injuries, particularly strokes. The nanoparticles are engineered with a molecular system capable of selectively recognizing damaged neurons.



Participation in innovative public procurement initiatives: NEUMONAS

The NeuMoNaS project responds to a pre-commercial public procurement tender issued by CDTI on the technological challenge of neuromodulation, defined as the inhibition, stimulation, or therapeutic alteration of nervous system activity. The project aims to meet requirements such as deep-brain, non-invasive, multifocal, and easy-to-operate modulation using state-of-the-art technologies, progressing from a proof-of-concept (TRL3) to a functional prototype (TRL6) within 24 months through a three-phase research program.

The project is carried out by the NanoNeuro consortium, established in 2022 and comprising nearly 10 research institutions in the Basque Country (including MCP), with Tecnalia acting as the intermediary with CDTI.

The main objective is to develop, test, and validate a non-invasive neuromodulation prototype based on physical principles, enabling brain modulation through functionalised nanoparticles and infrared or magnetic stimulation. The system is designed as an acute therapy to reduce brain lesion volume caused by ischaemic stroke.

Technological objectives include selective neuron targeting using nanoparticles to improve resolution, development of non-invasive stimulation systems using light and magnetic energy, and validation in high-impact use cases such as ischaemic stroke and Parkinson's disease. The resulting technology aims to achieve unprecedented resolution, surpassing invasive systems by targeting specific cells in a targeted area.

The NeuMoNaS project has a total budget of €8.99 million (+VAT), which is among the largest public tenders offered by CDTI and is executed entirely in the Basque Country. The project has completed Phase III and is expected to further pursue the technological objectives by the support of CDTI and CSIC

The consortium has proposed royalty payments to CDTI and the creation of a future company to be established by Tecnalia in 2026. Therefore, NeuMoNaS is an excellent and unprecedented opportunity to translate the scientific advancement toward a technological solution, which without any doubt will generate added value in the local environment.

Creation of spin-off: PHOTOKRETE S.L.

Photokrete S.L. is a Deeptech climate company in the construction sector, a spin-off of CFM-CSIC, UPNA and UPV/EHU, developing photonic cementitious materials with radiative, daytime and autonomous cooling capabilities. It has created the first mortar capable of cooling itself in response to solar radiation, maintaining a temperature lower than ambient, reducing surface temperature by more than 30 degrees and generating a cooling effect in cities of up to 12 degrees during heat waves. This technology is currently the only comprehensive and scalable solution to mitigate the urban heat island effect and is protected by three patents exclusively licensed to Photokrete.

Photokrete has four key competitive advantages: high potential to reduce air conditioning energy consumption (over 70% savings), significant reduction of CO2 emissions, the only scalable solution to mitigate the urban heat island effect, and industrial scalability without requiring changes in production processes or major investments.

The technology originated from the European H2020 MIRACLE project, funded with more than €3 million, and led by Dr Jorge Sánchez Dolado (CFM, CSIC-EHU), with the participation of internationally renowned scientific institutions. The EIC Pathfinder Coolcrete project has promoted the advancement of the technology, which is currently at TRL6

Photokrete has been accelerated by the Impulsa-T CSIC program, awarded First Prize at the Rebuild 2025 Contech Startup Forum, and recognized in the Top 101 SpainUp Nation 2025 and Top 100 Startups for Investment 2025/2026.

Photokrete addresses key global challenges including climate change, urban heat island effect, energy efficiency, and sustainable construction materials. It has completed scaling pilots, secured industrial partners for production and product development, and focuses on high-value markets. It operates in a profitable niche of specialty mortars with margins above 40–50%.

PhotoKrete

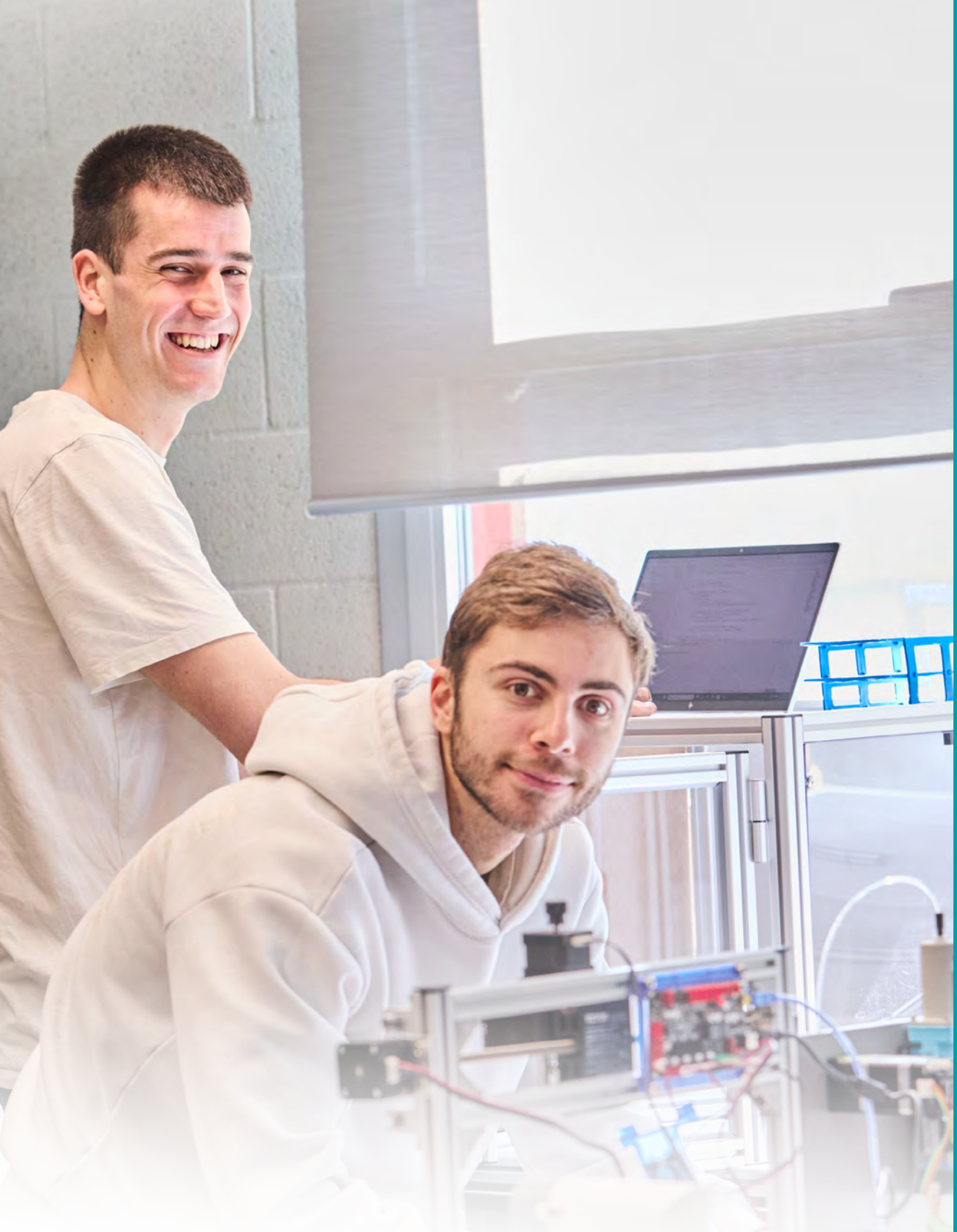
EDUCATION

17
Defended
PhD Theses

6
Defended
Master Theses

6
Undergraduate
Projects

12
International stays of predoctoral researchers of CFM in top scientific centers



As a joint center which belongs to the University of the Basque Country (EHU), the training activities at CFM include the participation in both the Master and PhD program through the Department of Material Physics of EHU, as well as setting complementary training activities and post-doctoral researchers training. All these activities are strongly related to and coordinated with the research activities of the different research groups at CFM. In the following we note the main aspects of the training activities at CFM.

POST-DOCTORAL TRAINING

CFM encourages the research groups to hire post-doctoral researchers through internal calls, which support around 2-3 post-doc positions every year. Post-doctoral researchers make extremely valuable contributions to the research activities, but they are at an early stage of their scientific careers, which means that they still need to acquire further research skills to successfully develop their scientific careers at a later stage. Therefore, each research group makes an individual follow-up and training program for these young researchers.

PhD PROGRAM: Physics of Nanostructures and Advanced Materials

"Physics of Nanostructures and Advanced Materials" is a PhD program of EHU that has been recognized as a highly qualified PhD program by the Spanish Ministry of Education (MEE2011-0591 citation of excellence). Within this program, more than 70 pre-doctoral researchers develop their research fully embedded in the daily life of the research groups in the center.

The aforementioned PhD program participates in the European Doctorate Program of "Physics and Chemistry of Advanced Materials" (PCAM). PCAM is a European research network of doctoral programs focusing on various aspects of the physics and chemistry of advanced materials.

PHD THESES DEFENDED IN 2025

Superconducting Phenomena at the Nanoscale

Author: Jon Ortuzar Andrés

Supervisors: Jose Ignacio Pascual and F. Sebastian Bergeret

January 23, 2025

Two-Dimensional Magnetism and Molecular Interaction in Transition Metal Dihalides

Author: Andrea Aguirre Baños

Supervisors: Martina Corso and Jose Ignacio Pascual

January 24, 2025

Synthesis of Single-Chain Nanoparticles for Catalysis and Sensing

Author: Jokin Pinatxo Olaziregi

Supervisors: José A. Pomposo and Daniel Taton

March 24, 2025

Theoretical description of femtosecond laser-induced desorption dynamics using ab initio and machine learning methods: pure CO and mixed CO+O adlayers on Pd(111)

Author: Alfredo Serrano Jiménez

Supervisors: Maite Alducin Ochoa and Joseba Iñaki Juaristi Oliden

March 28, 2025

Synthesis and structural characterization of single-chain nanoparticles from polypeptides and proteins

Author: Thu Phuong Le

Supervisors: Arantxa Arbe and Paula Malo De Molina

June 20, 2025

Optical trapping with vortex beams: modeling of experimental settings through multipolar decomposition

Author: Iker Gómez Viloria

Supervisors: Gabriel Molina Terriza

July 07, 2025

Photon statistics and entanglement from two interacting quantum emitters

Author: Adrián Juan Delgado

Supervisors: Ruben Esteban and Javier Aizpurua

July 28, 2025

Atomistic ab initio study of optical excitations in nanoplasmonic systems as probed by light and fast electrons

Author: Bruno Candelas Peñalba

Supervisors: Nerea Zabala and Javier Aizpurua

May 9, 2025

Properties of magnetic molecules on superconducting and normal metal substrates

Author: Divya Jyoti

Supervisors: Nicolás Lorente and Deung-Jang Choi

September 30, 2025

Growth and Electronic Properties of Rare-Earth-Noble Metal Surface Compounds Grown on Curved Single Crystals and their Protection by 2D Materials

Author: Alaa Mohammed Idris Bakhit

Supervisors: Frederik M. Schiller

October 20, 2025

Nonlinear optics from a dual perspective: from the perturbative framework to Floquet theory

Author: Álvaro Ruiz Puente

Supervisors: Julen Ibañez Azpiroz

November 6, 2025

Bridging Nanotechnology and Neurobiology: Voltage-Sensing and Photothermal Control of Neural Activity Using Semiconductor and Metallic Nanocrystals

Author: Zuzanna Lawera

Supervisors: Marek Grzelczak and Rafael Yuste

November 7, 2025

Structural, Electronic and Magnetic Properties of 2D Semiconducting CoCl2 and CoBr2 on Au(111) and Bi2Se3

Author: Samuel Kerschbaumer

Supervisors: Celia Rogero Blanco and Maxim Ilyn

November 17, 2025

Corannulene and Perylene – an exploration and comparison of their structure and dynamics

Author: Balthasar Braunewell

Supervisors: Felix Fernández Alonso and Ronen Zango

November 18, 2025

Toward controlling the topology of branched cyclic polyglycerol: from the monomer approach to the hypergrafting of cyclic polyglycidol

Author: Carlo Andrea Pagnacco

Supervisors: Fabienne Barroso Bujans

December 5, 2025

Structure and Dynamics of Methylammonium Lead Iodide across Physical Space

Author: Pelayo Marín Villa

Supervisors: Félix Fernández Alonso and Kacper Druzbicki

December 12, 2025

Characterization Methods Based on Mie Scattering

Author: Martín Molezuelas Ferreras

Supervisor: Gabriel Molina Terriza

December 18, 2025

SHORT STAYS AT FOREIGN UNIVERSITIES

A very important aspect of the PhD training program consists of supporting short stays in foreign universities and centers for PhD students. This year 6 pre-doctoral researchers have spent about 2-3 months in some of the best international centers on their topics. This training activity combines aspects of internationalization and excellence, and has been strongly supported by CFM over the last years. The following pre-doctoral researchers benefited from an internship abroad supported by CFM in 2025:

Isabel Pascual Robledo
Freie Universität Berlin, Germany
Supervisor: Javier Aizpurua

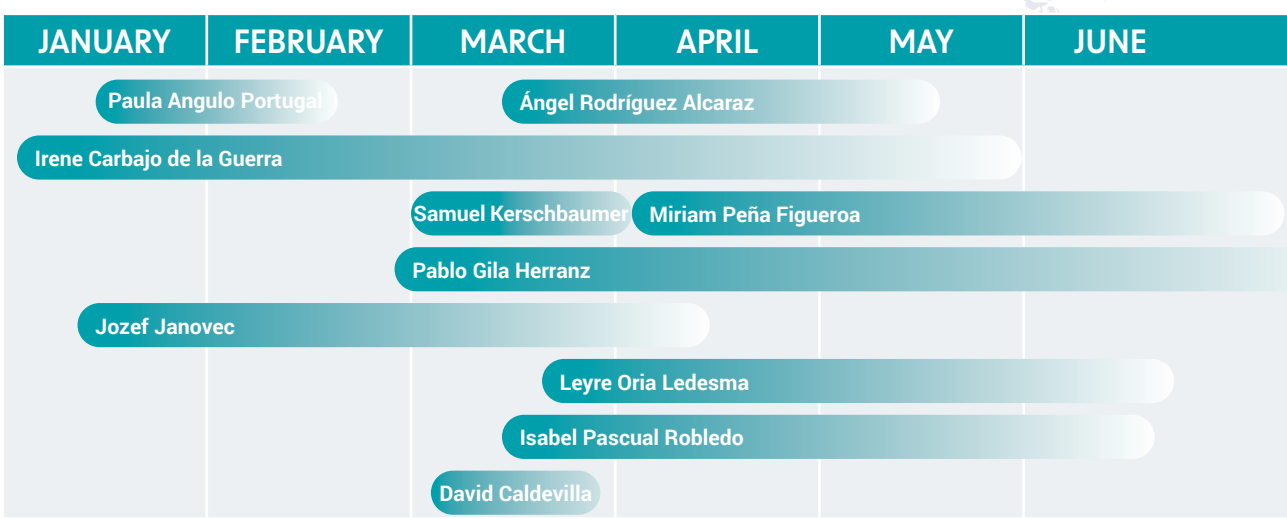
Miriam Peña Figueroa
University of Cambridge, England
Supervisor: Ester Verde

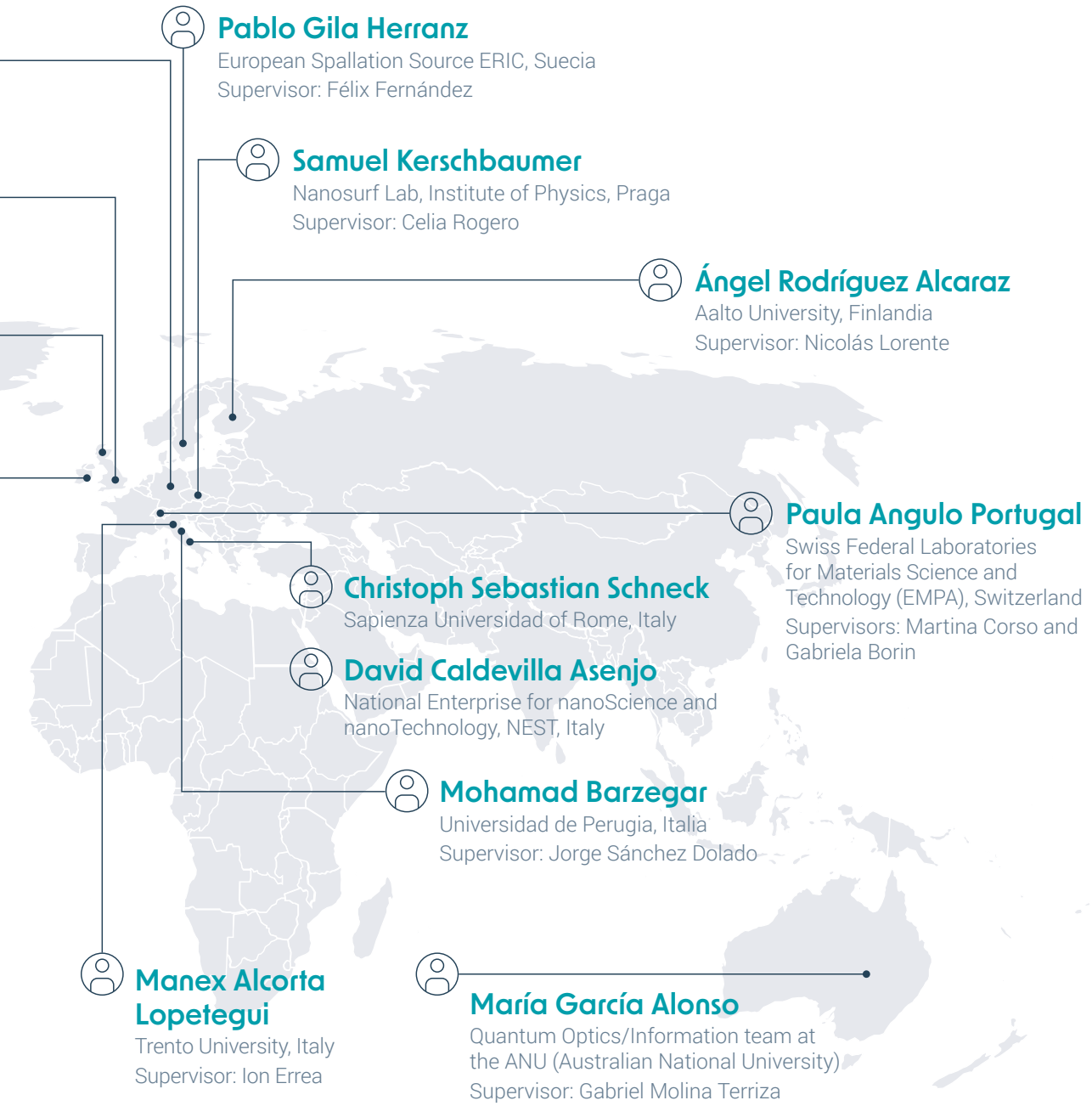
Irene Carbajo de la Guerra
University of Strathclyde, Escocia
Supervisor: Ivan Sasseli

Benjamin Tirado Heras
IBM Research Dublin, Ireland

Leyre Oria Ledesma
University of North Carolina at Chapel Hill, USA
Supervisor: Armando Maestro

Jozef Janovec
University of Central Florida, Orlando, USA
Supervisor: Andrés Ayuela





Pablo Gila Herranz
European Spallation Source ERIC, Suecia
Supervisor: Félix Fernández

Samuel Kerschbaumer
Nanosurf Lab, Institute of Physics, Praga
Supervisor: Celia Rogero

Ángel Rodríguez Alcaraz
Aalto University, Finlandia
Supervisor: Nicolás Lorente

Paula Angulo Portugal
Swiss Federal Laboratories for Materials Science and Technology (EMPA), Switzerland
Supervisors: Martina Corso and Gabriela Borin

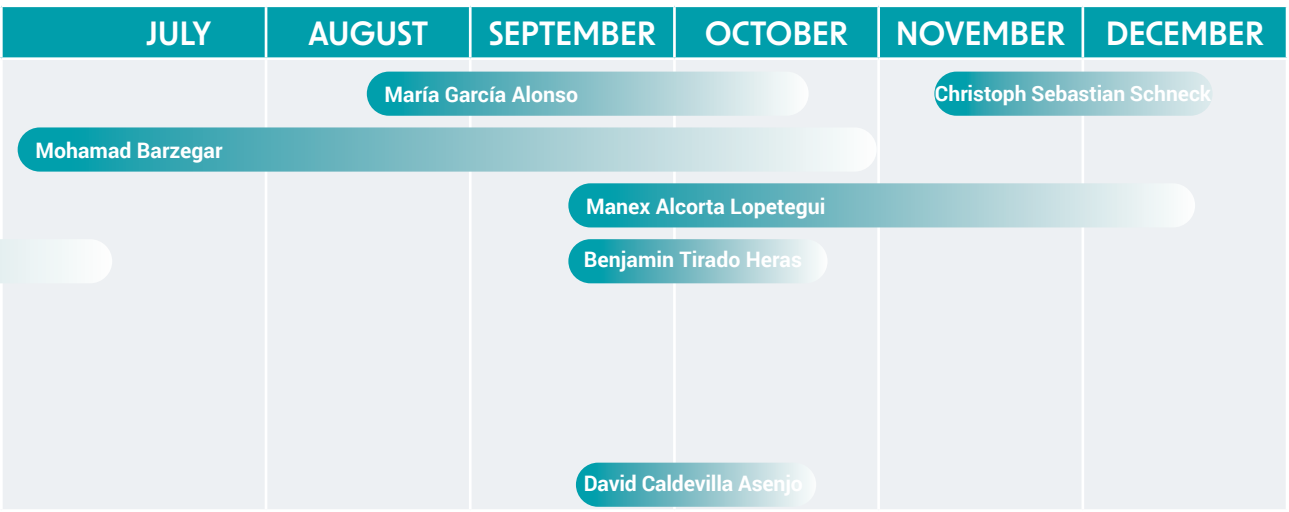
Christoph Sebastian Schneck
Sapienza Universidad of Rome, Italy

David Caldevilla Asenjo
National Enterprise for nanoScience and nanoTechnology, NEST, Italy

Mohamad Barzegar
Universidad de Perugia, Italia
Supervisor: Jorge Sánchez Dolado

Manex Alcorta Lopetegui
Trento University, Italy
Supervisor: Ion Errea

María García Alonso
Quantum Optics/Information team at the ANU (Australian National University)
Supervisor: Gabriel Molina Terriza



TRANSFERABLE SKILLS PROGRAM

Equipping researchers with skills beyond the purely scientific is a challenge that institutions are beginning to take up in the framework of what is known as the "transferable skills" education programs. Organized by Aitzol García-Etxarri (DIPC, Ikerbasque) and Gustavo A. Schwartz Pomeraniec (DIPC, CFM-CSIC) launched a full program covering issues like stress management, time and career management or transformative leadership.

An example of open acces: BERC BCAM

Miguel Ángel Benítez Lozano

Basque Center of Applied Mathematics (BCAM)

June 4, 2025

DIPC Josebe Olarra Auditorium, Donostia / San Sebastián

It introduced what open access in publishing is like in a BERC centre: BCAM, how they have adapted their centre to European and national mandates and what the process of change has been like. They focused on the importance of the preprint, talk about quantitative indicators and the DORA and COARA declarations.

Scientific writing training

Sofía Facal

Skills for Science

September 16-18, 2025

CFM Auditorium, Donostia/San Sebastián

The ability to communicate complex topics in a clear and efficient way is a key skill in the academic field, as the success of bright ideas, great initiatives and promising projects can depend significantly on how they are presented.

This workshop is designed for predoc researchers and early-career postdocs who wish to strengthen one of the most critical skills for success in science: scientific writing.

This training guide participants through the key elements of scientific writing, from planning and drafting to publication, while also offering practical tools to communicate complex ideas clearly and effectively.

Session 1	Session 2	Session 3
Foundations of Scientific Writing • Developing a scientific writing mindset: time management • Overcoming writing barriers • Structure of scientific documents: differences between papers, theses, and grant proposals	**Building Effective Scientific Narratives** • Crafting a clear and compelling research story • Selecting and organizing content effectively • Handling raw data, figures, and tables • Enhancing coherence and cohesion in writing • ***Special guest session:*** Editorial insights with Prof. Javier Aizpurua	**Publishing and Communicating Science** • Strategies for clear and concise scientific communication: avoiding common pitfalls • Understanding the publication and peer-review process • Practical writing exercises and group discussions • Peer review dynamic

Cross-cultural working: understanding difference and maximizing diversity in science

Alicia Marín Muniesa

October 29-30, 2025

CFM Auditorium

At CFM we have an increasingly diverse community. While it can be very enriching and stimulating, it can also lead to some challenges, as the chances for misunderstanding, conflict, and damaged relationships may rise.

This workshop contributes to develop the skills, knowledge, and personal attitudes needed to succeed in a cross-cultural working environment, and it is designed to help participants understand their own communication style, how it impacts others, and how culture can influence communicative effectiveness.

Curiosity and creativity in art and science

Melissa Pierce Murray

October 13, 2025

DIPC Meeting Room

In this talk, Melissa Pierce Murray explores curiosity and creativity in science and art, sharing examples from her own interdisciplinary practice. She discusses artistic and scientific methodologies, sensing and perception, and the role of metaphor in meaning creation and communication. The talk is followed by a hands-on workshop exploring perception through drawing.

II PHD DAY

In 2025 we celebrated the second edition of the CFM PhD Day. During the day, all the mid-career PhD students, supervised by the CFM scientific staff, gave a short talk to a general scientific audience. It brought together more than 80 researchers from our centre, being a unique opportunity to learn about the ongoing projects, promote the exchange of knowledge and strengthen ties between all members of the community, as it is a meeting point for all CFM scientific staff.

Sruthibhai Palakkattu Kunnu Venugopalan

Atomic Scale characterisation of catalytic processes

Rainer Bravo Pino

Cooling cities with cement colored multilayer cement inspired by morpho butterfly

Jehyeok Ryu

Perovskite nanocrystals as sources of single photons

Leyre Oria Ledesma

Single Chain Nanoparticles SCNPs for drug delivery

Paschalis Agapitos

Wikipedia´s biography´s knowledge representations Big Data

Christoph Schneck

Self healing SCNPs fluid approach

Sebastian Negrete Aragón

Atomic level control of elementary molecule on surface reactions molecular beams and XPS

Carolina Iacovone

Removal of pharmaceutics from water with pectine

Irene Carbajo de la Guerra

Understanding protein addition reduce the corona effect

Asier Mongelos Martínez

Nitrogen vacancy based quantum sensing

Miriam Peña Figueroa

Amphilic copolymers (Random and block)

Aadesh Mohan Naik

Thermoplasmonics with gold nanoparticles

Manex Alkorta Lopetegui

Symmetry-broken ground state and phonon meadiated superconductivity

MASTER EDUCATION PROGRAM

MASTER IN NANOSCIENCE

The Master in Nanoscience, an official UPV/EHU program held at CFM, offers students the chance to complete a Master thesis with research groups at the center. They gain hands-on experience in advanced materials research and can choose between applied or fundamental research paths, potentially leading to a PhD program.

MASTER THESES DEFENDED IN 2025

Characterization of superconducting junctions by spin-polarized electron tunnelling spectroscopy

Author: Pietro Cattaneo

Supervisor: Sara Catalano and Andrea Picone

April 30, 2025

Síntesis de macroiniciadores cíclicos basados en terc-butil glicidil éter

Author: Katy Domínguez Farinango

Supervisor: Fabienne Barroso Bujans

September 26, 2025

Tailoring Surface Properties to Control PVDF Crystallisation for Enhanced Functional Materials

Author: Andrés Mosquera Vallín

Supervisors: Jon Maiz Sancho and Alberto Álvarez Fernández

June 18, 2025

Creation of nitrogen-vacancy centers by Focused Ion Beam in diamond engineered for quantum magnetometry

Author: Ander Goirigolzarri García

Supervisor: Rolindes Balda de la Cruz

September 22, 2025

Unveiling the charge-density wave phase diagram of the Kagome metal CsV3Sb5 under pressure via first principles and machine learning potentials

Author: Iñaki Agraso Sánchez

Supervisors: Ion Errea Lope and Maia G. Vergniory

August 31, 2025

PSS stability and degradation in Organic Solar Cells

Author: Aniol Closa Garriga

Supervisor: Rolindes Balda de la Cruz

September 23, 2025

UNDERGRADUATE EDUCATION PROGRAM

COURSES

In addition to the Master's and PhD programs, the staff at CFM also participates in a variety of undergraduate courses in 4 Faculties and University Schools of the University of the Basque Country (UPV/EHU). In total, more than 1400 teaching hours spread over 6 undergraduate degrees and 2 Master degrees at UPV/EHU are delivered by CFM staff.

In the framework of this teaching activity, undergraduate students can join a research group at CFM for a short stay or to fulfill their End of Course Project during the academic year. CFM hosted the visit of 12 undergraduate students, and supported the defense of 6 of those.

DEFENDED BACHELOR PROJECTS

Korronte induzituen bitartez estaldura eroaleen azpian erredurak neurtzeko gaitasunaren ebaluazioa (KOATING)

Author: Julen Larrañaga

Supervisors: Irati Sánchez and Nerea Zabala Unzalu

Noise reduction techniques in infrared nano-spectroscopy. Applying minimum noise fraction for enhanced near-field hyperspectral imaging

Author: Leire Zufia Miguel

Supervisor: Martin Schnell and Nerea Zabala Unzalu

Influencia del blanqueo del plasmón en la espectroscopía Raman mejorada en superficie

Author: Sonia Rodríguez

Supervisor: Aurelian Loirette-Pelous and Nerea Zabala Unzalu

Copolímeros avanzados para llevar terapias directamente a células cancerígenas

Author: Tudor George Pirpilita

Supervisor: Josetxo Pomposo Alonso

Reutilización de residuos plásticos para producir catalizadores innovadores

Author: Endika Miranda

Supervisor: Josetxo Pomposo Alonso

Diseño de metamateriales en el rango de microondas

Author: Iñigo Madariaga

Supervisor: Nerea Zabala Unzalu

SCIENCE AND SOCIETY

+ 60
activities and events, many of them in collaboration with other institutions

+ 18 000
participants

+ 40
researchers of CFM's staff (50% women)

THANKS

The goal of the CFM's Science and Society program is to bridge the gap between science and the public, to enhance public awareness and appreciation of science, and foster a more informed and scientifically literate society, encouraging more active and meaningful participation in scientific research and innovation.

Objectives

- **Spreading scientific culture**
- **Inspiring scientific vocation**
- **Mainstreaming gender equality in all the activities organized**

Over the years, CFM has implemented a comprehensive scientific outreach program, and during 2025 more than 60 activities and events were organized, many of them in collaboration with other institutions.

Culture, vocation, gender perspective and diversity: We do care

Including the **gender and diversity perspective** in all the activities organized is a commitment acquired by CFM and is materialized as follows:

- **Maximizing the visibility of our women researchers**
- **Ensuring the gender balance in the talks organized**
- **Promoting the awareness on the situation**
- **Promoting diversity as the only possible way forward**

#scienceandsociety

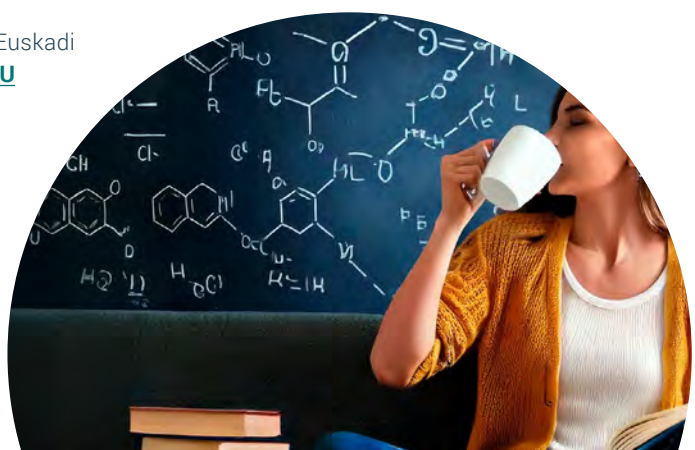
CFM takes full responsibility for science education and communication, as a way to foster a scientifically literate citizenship

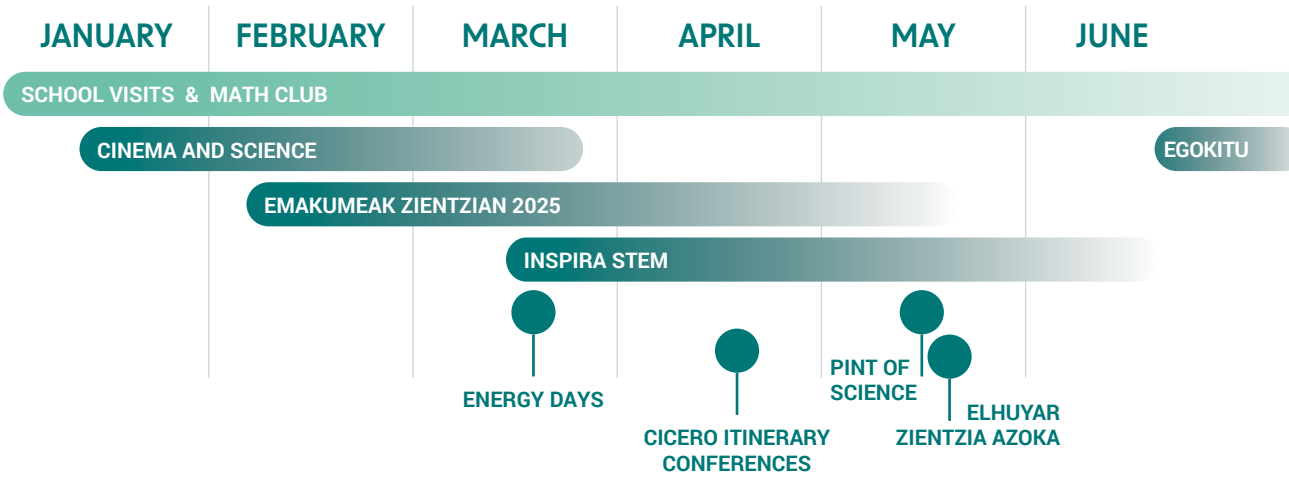
Activity in mass media

Press articles	Online press	Radio	TV
56	**205**	**52**	**5**

Podcast

"Zientzia Gosaria" (science breakfast) in Euskadi Irratia radio and in the new platform **GUAU**





SCHOOL VISITS

In 2025 this successful program reached more than **800 students** from **23 different schools** that had the chance to interact with more than **20 professionals** from DIPC and CFM. Moreover, the opportunity to participate in the online visits turned out to be a great way to reach schools from further territories like Biscay and small villages that usually could not travel to attend the face to face visit.

VIRTUAL TOUR OF THE LABS:

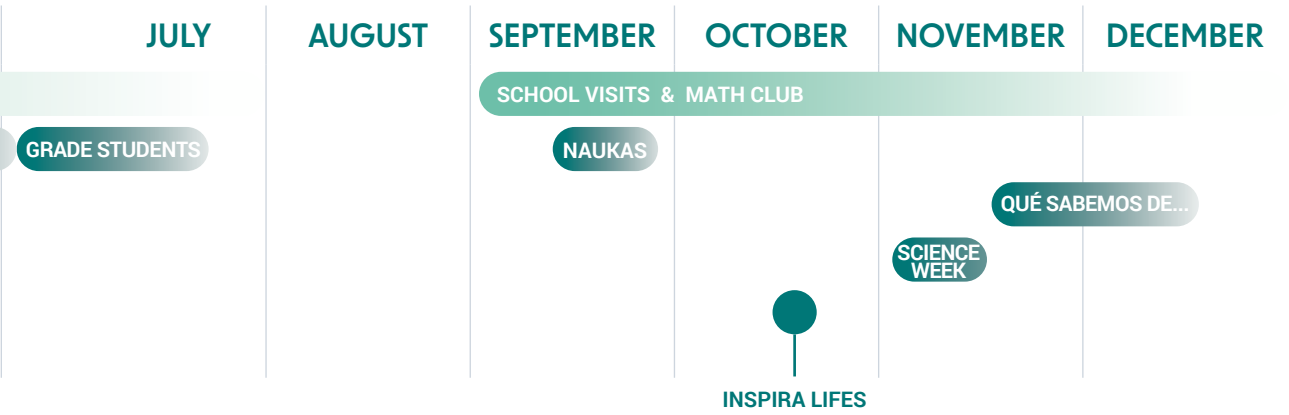
- **Polymer synthesis lab at CFM**
- **Dielectric spectroscopy lab at CFM**
- **Nanophysics lab at CFM**
- **Quantum nanophotonics lab at CFM**

Egokitu

CFM joined the EGOKITU program, which offers final-year high school students the opportunity to take part in a summer science camp at UPV/EHU. As part of this initiative, the Faculty of Chemistry in Donostia/San Sebastián provides a two-week immersive experience for student groups, including visits to DIPC and CFM.

Grade students

In 2025, CFM launched a new collaboration to host visits from science students, particularly in physics and technology, strengthening connections with potential future researchers. The center welcomed students from Mondragon University and participants of the National Physics Students' Meeting (ENEF), coordinated by the Royal Spanish Physics Society in Bilbao. This successful initiative has established a solid foundation and is expected to continue in the coming years.



FACE TO FACE ONLINE

JANUARY 17 Arratia BHI (Igorre)	**FEBRUARY 14** **Emakumeak Zientzian** Oteitza Lizeoa (Zarautz) Lauro Ikastola (Loiu) Laudio BHI (Laudio) IES Minas (Barakaldo) Jesuitak Indautxu (Bilbao) IES Usandizaga Peñaflorida BHI (Donostia) El Pilar Ikastetxea (Irun)	**MARCH 7** Aita Larramendi ikastola (Andoain) San Benito Lazkaoko Ikastola (Lazkao)	**APRIL 11** Erain (Irun) Axular Lizeoa (Donostia)	**MAY 9** Colegio Inglés San Patricio (Donostia)	**JUNE 6** La Salle-Legazpi Ikastetxea (Zumarraga)
JUNE 13 Mondragón Unibertsitatea	**JUNE 25 & JULY 2** EGOKITU	**JULY 23** Encuentro Nacional de Estudiantes de Física	**OCTOBER 10** Urnietako Salesiarrak (Urnieta)	**NOVEMBER 14** Urretxu-Zumarraga Ikastola (Urretxu) Beasain BHI (Beasain)	**DECEMBER 12** Zumaiena ikastola (Zumaia) Toki Ona BHI (Bera) IES Unamuno BHI (Bilbao)

MATH CLUB DONOSTIA

The Math Club, created in 2024 by CFM researcher Stepan Tsirkin, continued its activities in 2025 with a stronger online format while maintaining several in-person events at CFM and DIPC. The club organised 20 online sessions, three in-person meetings, and a special session to prepare students for local and national mathematics Olympiads. In addition, three mathematical battle competitions were held during the year. The initiative remained an active space to explore mathematics beyond the school curriculum, fostering creativity and problem-solving skills, with more than 150 children participating in the activities.

+ INFO: **math.dipc.org**

THE QUANTUM MILE

2025 saw the inauguration of the Quantum Mile, a scientific and technological route that takes in the most important centers dedicated to quantum research in the Ibaeta hub, one of the most active in Europe.

Visit the Quantum Mile scanning this code:

The route offers two complementary ways to explore it:

- Walking route: a signposted walk with seven informative infographics installed at the entrance to the buildings that house the main research centers and faculties involved.
- Interactive virtual tour: a 360-degree digital tour that immerses visitors in the laboratories and research spaces, showing in detail the scientific work, technological equipment, and capabilities of each group.

Seven centers make up the Quantum Mile: Donostia International Physics Center (DIPC), CIC nanoGUNE, Tecnun (University of Navarra), the EHU's Computer Science and Chemistry Faculties, the new Ikerbasque building, headquarters of the Basque Quantum alliance and CFM.

CINEMA AND SCIENCE

This film series organized by DIPC and Filmoteca Vasca, featured CFM researchers who contributed to the presentation and discussion of selected movies.

THE THEORY OF EVERYTHING

Pedro Miguel Etxenike Landibar

January 10, 2025
Tabakalera (Donostia)

January 11, 2025
Bizkaia Aretoa (Bilbao)

KAMPEN OM TUNGTVANNET - LA BATALLA DEL AGUA PESADA

Daniel Sánchez Portal

March 20, 2025
Artium Museoa (Vitoria)

March 21, 2025
Tabakalera (Donostia)

Silvina Cerveny

March 22, 2025
Bizkaia Aretoa (Bilbao)

March 25, 2025
Golem Baiona (Pamplona)

EMAKUMEAK ZIENTZIAN 2025

emakumeakzientzian.eus

February 6-14, 2025

Since its launch in 2017, Emakumeak Zientzian has grown into a strong collaborative network of research centers and institutions, reaching 35 entities in 2025 after expanding to Álava, and mobilizing over 300 volunteers across more than 60 activities aimed at diverse audiences. Supported by key institutions—including provincial councils, research organizations, and new partners such as Bilbao Ekintza—the initiative continues to strengthen territorial collaboration. Its core mission remains to promote the visibility of women in science, challenge gender stereotypes, inspire girls to pursue STEM careers, and build a solid, inclusive network committed to advancing gender equality in STEM.

+60
Activities

+10 623
Attendees

+300
Volunteers **(87% women)**

35
Research centers and science-related institutions

85 000
of funding

CFM'S ACTIVITIES IN EMAKUMEAK ZIENTZIAN

Plant the seed

Under the slogan “plant the seed of equality,” Emakumeak Zientzian highlighted the importance of sustained, long-term efforts beyond February 11, emphasizing that each action contributes to lasting change; this message was reinforced through a video featuring testimonials from researchers, educators, students, and institutional representatives committed to advancing equality in science and technology.

- **Celia Rogero - CFM**
- Itziar Astigarraga Blanco - HU cruces, ISS Biobizkaia eta UPV/EHU
- Naia Martin - IES Botikazar
- Marta Anza - IES Botikazar
- Miren Elgarresta - Emakunde
- Alaitz Landaluze - Innobasque
- Garazi Andonegi - Elhuyar

Women in science today and yesterday

General

February 10, 2025

Sala Club - Victoria Eugenia

Five female scientists working at research centers in Gipuzkoa took the stage at the Club del Victoria Eugenia to talk about the research they are involved in and pay tribute to some of the great female scientists in history by recounting their fascinating lives and scientific contributions.

OIHANE MITXELENA
TRIBUTE TO GERTRUDE BELLE ELLION
Postdoctoral researcher in BioGipuzkoa

NAGORE BARRENA
TRIBUTE TO FEI-FEI LI
Proffesor at the Informatics Faculty of EHU

MARTINA CORSO
TRIBUTE TO MARGHERITA HACK
Scientific Senior researcher at CFM

HARRITXU GETE
TRIBUTE TO MARGARET HAMILTON
Researcher in Vicomtech

ARANTZA MURIANA
HOMENAJEA A MARIE CURIE
Co-founder, Director of R&D Management, and CEO of the Biobide subsidiary in the USA

The power of experience

Women +55

CFM

February 11, 2025

May 22, 2025

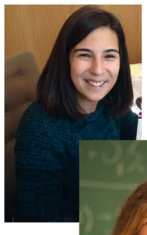
Ondarroa (Zientziaren giltzak)

In this workshop, participants explored the world of research and discovered everyday science through simple, hands-on experiments.

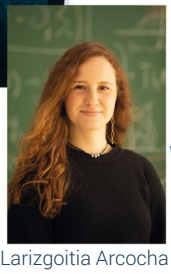
Online school visit to DIPC and CFM

Schools

February 14, 2025



Ester Verde Sesto



Leire Larizgoitia Arcocha

Belen Isla Rodríguez

María García Alonso

Back to school

The program includes visits by our female researchers to schools, where they provide insight into the current state of gender equality in science and share their research in an engaging and approachable manner.

- **Irene Vettori**

February 25, 2025

Amara Berri (Donostia)

- **Paula Angulo Portugal**

March 6, 2025

Axular lizeoa

CFM women researcher - video campaign: Amaia Elizaran Mendarte

ENERGY DAYS

The National network CAT&SCALE and the European consortium ANEMEL, in collaboration with the University of the Basque Country (UPV/EHU) and CFM, offered the keys to the energy transition through a talk and round table given by expert scientists, and a hands on workshop devoted to families.

ENERGY TALK AND ROUND TABLE

Pau Farrás, Nuria López, and Sara Barja

March 21, 2025

Aquarium Donostia

ENERGY WORKSHOP

March 22, 2025

Eureka! Zientzia Museoa

THE CFM AT CSIC'S CICERO ITINERARY CONFERENCES

April 21, 2025

Madrid

The Cicero Itinerary brought CSIC advances in quantum technologies closer to society, with the participation of CFM researcher Gabriel Molina Terriza, among other experts. The work of Professor Molina Terriza on the physics of the interactions of quantum light and matter at the nanoscale was highlighted in this unique conferences where he presented the advances being developed in his quantum nanophotonics laboratory at the CFM.

The conference 'Cicero Itineraries: Challenges and opportunities in the quantum world' was designed to bring society closer to the institution's work in this field, which opens up the possibility of capturing, communicating and processing information using the quantum nature of matter and light.

INSPIRA STEM

March-June, 2025

CFM researcher **Beatriz Robles Hernández**, participated in the INSPIRA STEM program, an initiative led by the University of Deusto that promotes scientific and technological vocations among young students through mentoring by female professionals. As part of the program, she delivered six sessions to 25 primary school students at Amara Berri school, helping to spark their interest in STEM fields.

PINT OF SCIENCE

DONOSTIA / SAN SEBASTIÁN
pintofscience.com

Pint of Science is an international festival that brings cutting-edge research to informal venues such as bars, fostering direct dialogue between scientists and the public; since 2018, CFM has supported the initiative, and in 2025 its involvement expanded with a team of volunteers, coordinated by Dr. Ivan Sasselli, contributing to the organization and featuring talks by CFM researchers.

Una cuchara de azúcar para agua más limpia

Francesco Coin

May 20, 2025

Averiguando si tu pareja te engaña cuánticamente

Gabriel Molina Terriza

May 20, 2025

ELHUYAR ZIENTZIA AZOKA

zientzia-azoka.elhuyar.eus/eu

May 21-24, 2025

Arenal (Bilbao)

In 2025, the Elhuyar Zientzia Azoka gathered more than 200 projects developed by young students during the course. Since 2019, CFM supports this science fair actively contributing in the mentorship and judging the projects in the fair. The awards consisted of study grants, trips to national and international fairs and stays in research companies and research centers such as the CFM.

NAUKAS BILBAO

H2Ohhh: Las fascinantes propiedades del agua

Sara Barja

September 19, 2025

Palacio Euskalduna (Bilbao)

Naukas KIDS (Workshop): Scale up your quantic world

September 21, 2025

Bizkaia Aretoa-EHU de Bilbao

INSPIRA LIFES

October 20, 2025

Kursaal auditorium, Donostia / San Sebastián

Since 2010, Eureka! Zientzia Museoa and Kutxa Fundazioa have organized a conference-style event where researchers share their "life in science" with high school students; CFM supports and actively participates in this initiative, which in 2025 brought together over 1,800 students and 80 professionals.

Ivan Sasselli Ramos

Armando Maestro Martín

"QUÉ SABEMOS DE..." TALK SERIES

cfm.ehu.es/outreach/quesabemosde

Kutxakultur plaza at Tabakalera, Donostia / San Sebastián

For the ninth consecutive year, the CFM organized the talk series "Qué sabemos de..." in Donostia/San Sebastián. This unique series of educational talks, is promoted by CSIC, and in 2025 was done in collaboration with Donostia Kultura and the Faculty of Chemistry of the University of the Basque Country, aiming to celebrate its 50th anniversary. All the talks focused on **chemistry**, giving us a first-hand insight not only into the most advanced science in this field, but also into the people who carry it out.

Available at **CFM's YouTube channel** or scanning this code

The vacuum: the philosophical pipe dream that has changed the way we live

Jose Ángel Martín-Gago
Director of ICMM
November 18, 2025

The Chemistry of Metals

Zoraida Freixa Fernández
Ikerbasque researcher at EHU
November 12, 2025

Smart Polymeric Materials

Ester Verde Sesto
Ikerbasque and Ramón y Cajal Researcher at CFM
December 2, 2025

Catalysis for a sustainable and emission-free energy future

Antonio Chica Lara
Instituto de Tecnología Química UPV-CSIC
December 9, 2025

New generation drugs

Fernando P. Cossio Mora
Ikerbasque´s Scientific Director
December 16, 2025

XVII SCIENCE WEEK (UPV/EHU)

November 6-8, 2025

Tabakalera, Donostia / San Sebastián

Stand "Exploring the world of materials"

DIPC, CIC nanoGUNE, CFM and POLYMAT joined to present material science to the public, focusing on how understanding matter at the nanoscale leads to smart materials with many applications.

Through demonstrations and experiments, they showcased this scientific world to over 1,000 visitors, including students and the general public.

Scale up your world

This family workshop designed by CFM explored scales from macro to nano under the theme "How far do our eyes see?". About 25 children and their families, guided by researchers, collected samples in Cristina Enea park and observed them using microscopes and magnifying tools to discover macro, micro, and nanoscale worlds.

@CFMdonostia

CFM is also present and active online and in the social media, and can be officially found in **X**, **Instagram**, **YouTube**, **Bluesky** and, **LinkedIn**, as well as in our **CFM website**. Users can **subscribe to CFM's mail list** to be updated on the information about the activities and events organized at CFM and stay tuned following CFM in our social media channels.

	Followers
X	1703
Instagram	736
LinkedIn	2000
Bluesky	200
Youtube	532

OUTREACH COLLABORATION NETWORK

Over the years, the CFM has managed to consolidate a network of active collaboration in the area of scientific dissemination that includes more than 30 science and technology agents in the Basque Country. Thanks to all our allies, it is a pleasure to work side by side to ensure that science reaches all citizens.

GENDER EQUALITY & DIVERSITY AT CFM

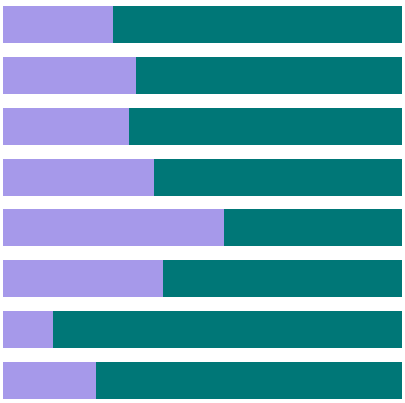
CFM is strongly committed to fostering gender equality, diversity, and inclusion across all its activities. Through dedicated policies, structured action plans, and active participation in awareness initiatives, the Centre promotes equal opportunities, supports diverse career development, and works to build an inclusive scientific environment aligned with international standards and societal needs.

NUMBERS AT A GLANCE

The following figures and graphics show the state of the art regarding gender equality at CFM. Over the 5 past years we can see an evolution from a 25/75 distribution of women/men research staff, to a more optimistic ratio of 34/66 in general trends. **Most importantly the percentage of predoc researchers at CFM has positively evolve from 25% to almost 38% in the past few years.**

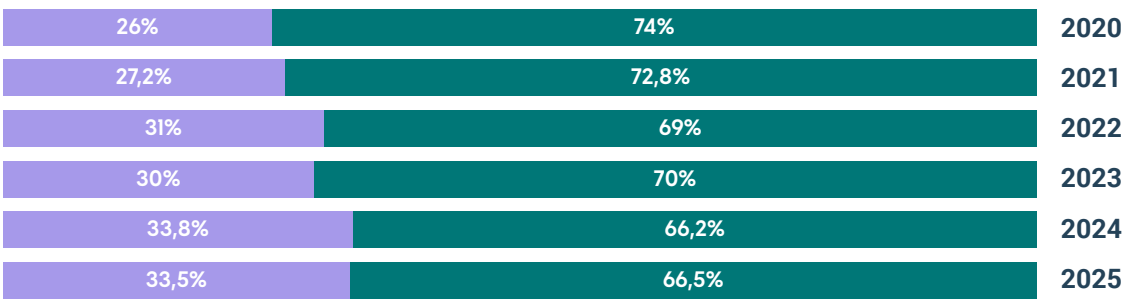
The gender imbalance is maintained as the responsibility of the job and level in the research career increases, corroborating the general trend observed in the Basque Country, in Spain and in Europe.

Distribution of staff by activity and gender in 2025

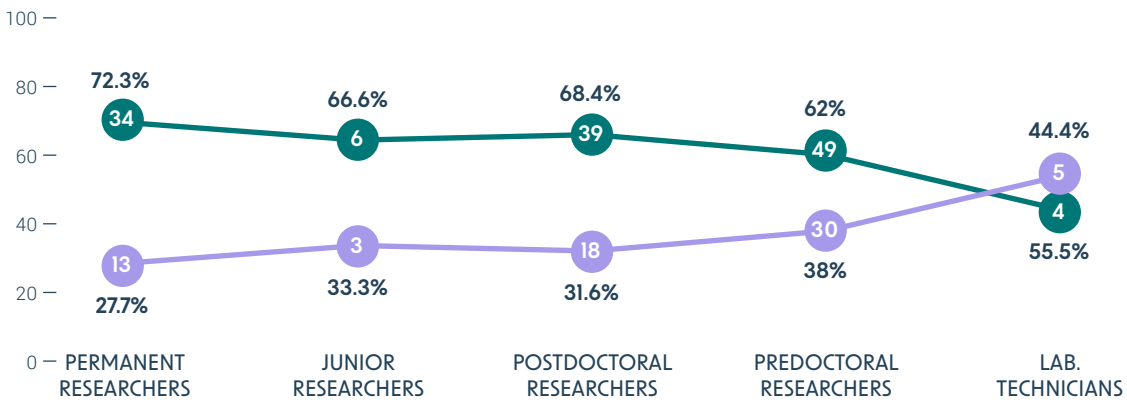


	♀	♂	
Permanent Scientific staff	13	34	**47**
Junior Scientist	3	6	**9**
Postdoctoral Researchers	18	39	**57**
Predoctoral Researchers	30	49	**79**
Technicians	5	4	**9**
Administration and Services	10	15	**25**
Master Students + Undergraduates	2	14	**9**
Guests reseachers	10	33	**43**

Percentage evolution of the gender distribution of the MPC-CFM's scientific and technical staff over the years



Percentage distribution of scientific staff in the MPC-CFM, according to category and gender in 2025

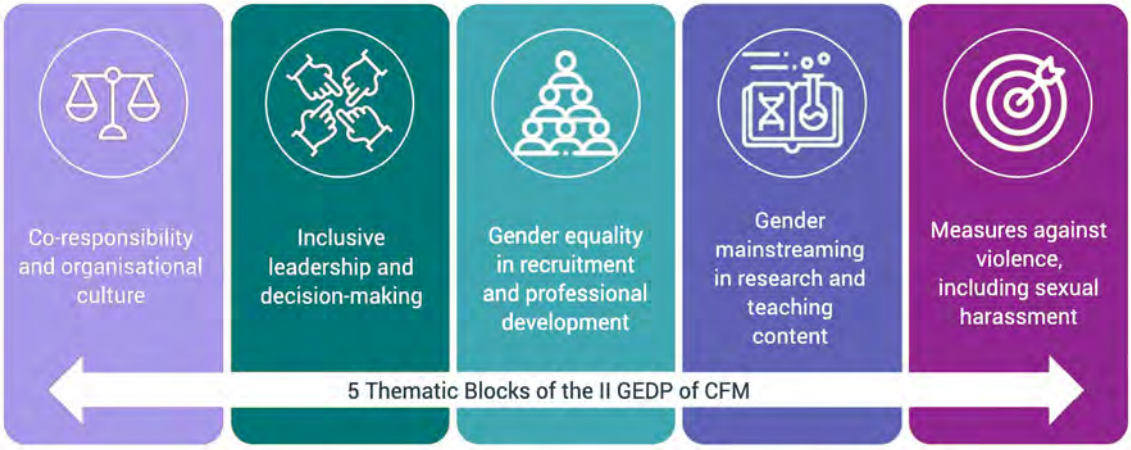


FIRST YEAR OF IMPLEMENTATION OF THE II GEDP OF CFM

2025 was the first of the four years to implement MPC-CFM's II Gender Equality and Diversity Plan, which includes a total of **55 actions**, divided into **five different thematic blocks** or lines of work.

In 2025
18 actions
were completed, and
4 on track

Read here the full plan by scanning this code or visit the **Gender Equality section at CFM´s website** for related content.



Key actions:

- Register de II GEDP at the official REGCON local registry of the Basque Government
- Proactive work on the Emakunde (Basque Institute for Gender Equality) Working Group on Gender Equality and Diversity (GED) on Research and Technological centers
- Socialize the new GEDP to the MPC-CFM community

MORE HIGHLIGHTED ACTIONS

Presence in gender panels of relevant decision making institutions such as Donostia/San Sebastian´s town hall gender council, or Ikerbasque

Specific gender training for the community

Gathering yearly records of gender distribution

Zero tolerance policy

Harassment protocol in place

Ensuring the representation of 50% of women in all the dissemination lectures organized by CFM

Encouraging women researchers to participate in the different dissemination programs, especially those aimed at children, families and young people.

Using the CFM social media to highlight the research results of the women scientists working at CFM

Promoting other initiatives that share the fundamental contributions of women in science, such as "Women with Science" by Marta Macho (Chair in Scientific Culture), "Women and Girls in Science Day", Donostia WeekInn, etc.

WORKING STRUCTURES

The MPC-CFM has established three working structures to address the responsibilities and tasks of the implementation of the 2nd Gender Equality and Diversity Plan (GEDP) within the organisation, ensuring all members of MPC-CFM staff are represented.

GENDER EQUALITY AND DIVERSITY COMMITTE

Predoctoral members
Zuzanna Lawera
Paschalis Agapitos
Divya Joti
Isabel Pascual Robledo

Senior researchers
Gabriel Molina Terriza
Nerea Zabala Unzalu

Postdoctoral - Associate researchers
Ester Verde Sesto
Rubén Pellicer Guridi

Administration
Arantza Iturrioz Ezeiza

Direction
Ion Errea Iope

MOTOR GROUP
Jon Ganuza Jimenez

GEDP coordinator
Idoia Mugica Mendiola

AWARENESS

Emakumeak Zientzian

Since its first edition in 2017, "Emakumeak Zientzian" has grown to be a consolidated, award winning, and participation record-breaking consortium, standing out in the set of actions devoted to raising awareness about gender issues at STEM among the society. Nevertheless, it has also been key to build a **much-needed network** of institutions committed to work together to break the gender divide in the scientific and technological field. **Emakumeak Zientzian** has been further described in depth in section 12- Science and Society of this report and constitutes the main achievement regarding social awareness on gender issues.

Gipuzkoa Coopera

Gipuzkoa Coopera explores the possibility of working together with researchers from countries with less presence in the international scientific community, while involving Gipuzkoa society in the responsibility of collaborating with these countries, promoting scientific activity as an engine of change and progress in any society. With this program CFM also wants to establish its commitment to other social aspects, actively contributing to promoting the development of science in countries with fewer resources.

CFM has been part of the program since its very beginning and over the last six years this has materialized in five collaborations with the foundation **Women for Africa**, through the programs **Ellas Investigan** devoted to senior researchers, aimed at promoting African women's access to science and technology, supporting them in their research careers, making their achievements visible and promoting their leadership in the international scientific community. This table lists the African women researchers who have carried out research stays at the centre in recent years.

African women researchers who have completed stays at MPC-CFM thanks to the Gipuzkoa Coopera program of the GFA/DFG

Call	Women Researcher	Year of intership	Host at CFM
Gipuzkoa Coopera - Ellas investigan 2019	**Dra. Mary B. Ogundiran (Nigeria)**	2021	Jorge Sánchez Dolado
Gipuzkoa Coopera - Ellas investigan 2020	**Dra. Abeer Adel (Egipto)**	2021	Silvina Cerveny Murcia
Gipuzkoa Coopera - Ellas investigan 2022	**Dra. Florette Corinne Fobasso Mbognou (Camerún)**	2023	Ion Errea Lope
Gipuzkoa Coopera - Ellas investigan 2023	**Dra. Yasmeen Elkony (Egipto)**	2024	Félix Fernández Alonso
Gipuzkoa Coopera - Ellas investigan 2025	**Dra. Omamuyovwi Rita Elkony (Nigeria)**	2026 (coming)	Félix Fernández Alonso

In addition to the *Ellas investigan* programme, MPC-CFM, on its own initiative and in conjunction with the DIPC, collaborates in the **Learn Africa** programme, also promoted by the Women for Africa Foundation, aimed at promoting knowledge transfer, exchange and training of African undergraduate and postgraduate students through scholarships. MPC-CFM and DIPC provide scholarships, that covered enrolment, travel, board and lodging in Donostia/San Sebastián, to African students to study the UPV/EHU's Master's Degree in Nanoscience taught at MPC-CFM, an initiative that has been maintained in 2024.

APPENDIX I
RESEARCH OUTPUT

LIST OF ISI PUBLICATIONS

1 **Molecular engineering of exchange bias in Fe3GeTe2/molecule heterostructures**
Sharma M, Jo J, Avedissian G, Bayindir B, Kang J, Sahin H, Casanova F, Gobbi M, and Hueso LE.
ACS Applied Electronic Materials 7, 9204 (2025)

2 **Hybrid carbon nitride/cobalt phthalocyanine nanocomposites for efficient photocatalytic hydrogen generation**
Arumugam LS, Durantini JE, Follana-Berná J, Schiller F, Etxebarria A, Forzanini L, Barja S, Sastre-Santos A, and Giménez S.
ACS Applied Energy Materials 8, 5056 (2025)

3 **Doping effects on magnetic layered hybrid organic–inorganic transition metal halide perovskites**
Mattioni S, Asensio Y, Solokha P, Olano-Vegas L, Prato M, De Negri S, Gobbi M, Casanova F, Mateo-Alonso A, Hueso LE, and Martín-García B.
ACS Applied Materials and Interfaces 17, 53745 (2025)

4 **Combined swelling and metal infiltration: advancing block copolymer pattern control for nanopatterning applications**
Mullen E, Alvarez-Fernandez A, Prochukhan N, Davó-Quiñonero A, Bekarevich R, Gity F, Sheehan B, Baez Vasquez JF, Gatensby R, Bentaleb A, Ward A, Hurley PK, and Morris MA.
ACS Applied Nano Materials 8, 1829 (2025)

5 **Photoluminescence enhancement at telecom wavelengths from PbS/CdS qantum dots coupled to a plasmonic crescent metasurface**
Al-Hamadani A, Gupta V, Montaño-Priede JL, Thomas R, Muravitskaya A, Markey L, Roux-Byl C, Pons T, Zapata-Herrera M, Zabala N, Weeber J-C, Suckow S, Vogel N, Bouillard J-SG, and Adawi AM.
ACS Applied Nano Materials 8, 19474 (2025)

6 **Interplay of manganese doping in lead-free Cs3Bi2Br9 nanocrystals**
Martin JH, Ruiz E, Lezama L, Ahmad S, and Kazim S.
ACS Applied Optical Materials 3, 2725 (2025)

7 **Bond-reversibility effects on self-crowding of unimacromolecular nano-objects**
Ruiz-Bardillo A, Asenjo-Sanz I, Verde-Sesto E, Porcar L, Kohlbrecher J, Pomposo JA, Moreno AJ, Arbe A, and Colmenero J.
Acs Macro Letters 14, 1389 (2025)

8 **Optomechanical pumping of collective molecular vibrations in plasmonic nanocavities** Jakob LA, Juan-Delgado A, Mueller NS, Hu S, Arul R, Boto RA, Esteban R, Aizpurua J, and Baumberg JJ.
ACS Nano 19, 10977 (2025)

9 **Tuning the dimensionality of protein-peptide coassemblies to build 2D conductive nanomaterials**
Perez-Chirinos L, Almonte L, Cortés-Ossa JD, Solano E, Calvo MR, Sasselli IR, and Cortajarena AL.
ACS Nano 19, 16500 (2025)

10 **Strong in-plane magnetic anisotropy in semiconducting monolayer CoCl2** Kerschbaumer S, Hadjadj SE, Aguirre-Baños A, Longo D, Pinar Solé A, Stetsovych O, Candia AE, Angulo-Portugal P, Caldevilla D, Choueikani F, Corso M, Serrate D, Lobo-Checa J, Jelínek P, Ilyn M, and Rogero C.
ACS Nano 19, 20693 (2025)

11 **Second-order conductivity probes a cascade of singularities in a Moiré superlattice**
Ahmed T, Tu BQ, Watanabe K, Taniguchi T, Gobbi M, Casanova F, and Hueso LE.
ACS Nano 19, 24930 (2025)

12 **Extending the MXenes to MOenes with emergent quantum phenomena**
Yan L, Liu J, Wu J, Li P, Ding Y-F, Gao H, Wang B-T, Zhang H, Xu W, and Zhou L.
ACS Nano 19, 30060 (2025)

13 **Giant purcell broadening and lamb shift for DNA-assembled near-infrared quantum emitters**
Verlekar S, Sanz-Paz M, Zapata-Herrera M, Pilo-Pais M, Kołątaj K, Esteban R, Aizpurua J, Acuna GP, and Galland C.
ACS Nano 19, 3172 (2025)

20 **Ferromagnetism above 200 K in organic-ion intercalated CrSBr**
Ferreira-Teixeira S, Tezze D, Ramos M, Álvarez-García C, Bayındır B, Jo J, Martín-García B, Ormaza M, Casanova F, Mañas-Valero S, Coronado E, Sahin H, Hueso LE, and Gobbi M.
ACS Nano 19, 36275 (2025)

15 **Emergence of Moiré Dirac fermions at the interface of topological and 2D magnetic insulators**
Klimovskikh II, Hadjadj SE, Thakur A, Saunot A, Rogero C, Tallarida M, Dai J, Trontl VM, Weber AP, Gu GD, Lobo-Checa J, Ilyn M, and Valla T.
ACS Nano 19, 36411 (2025)

16 **Orientational order of phenyl rotors on triangular platforms on Ag and Au(111)** Mortezapour B, Hamer S, Herges R, Robles R, and Berndt R.
ACS Nano 19, 38773 (2025)

17 **Multivalent interactions between chaperone and ribosome-nascent chain complex revealed by high-speed AFM and MD simulations**
Eider Nuñez, Prithwidip Saha, Markel G. Ibarluzea, Arantza Muguruza-Montero, Sara M-Alicante, Rafael Ramis, Aritz Leonardo, Aitor Bergara, Alvaro Villarroel, and Felix Rico.
ACS Nano 19, 42275 (2025)

18 **Electron-phonon coupling and phonon dynamics in single-layer NbSe2 on graphene: the role of Moiré phonons**
Al Taleb A, Wan W, Benedek G, Ugeda MM, and Farías D.
ACS Nano 19, 8895 (2025)

19 **Chemical activation of a single melamine molecule via isomerization followed by metalation with a copper atom**
Rothe K, Alkorta M, Néel N, Frederiksen T, and Kröger J.
ACS Nano 19, 9207 (2025)

20 **Why nanoscience needs standardized protocols-and how to get there**
Grzelczak M.
ACS Nanoscience Au 5, 112 (2025)

21 **A versatile fabrication route for screening of block copolymer membranes in bioprocessing**
Meng K, Alvarez-Fernandez A, Guldin S, and Bracewell DG.
ACS Omega 10, 8630 (2025)

22 **Femtosecond optical-field-driven currents in few-nanometer-size gaps with hot electron injection into metallic leads**
Borisov AG, Ma B, Zapata-Herrera M, Babaze A, Krüger M, and Aizpurua J.
ACS Photonics 12, 2137 (2025)

23 **Theoretical description of infrared near-field spectroscopy of in- and out-of-plane molecular vibrations in thin layers**
Pascual Robledo I, Maciel-Escudero C, Schnell M, Mester L, Aizpurua J, and Hillenbrand R.
ACS Photonics 12, 3782 (2025)

24 **Roadmap for photonics with 2D materials**
de Abajo FJG et al.
ACS Photonics 12, 3961 (2025)

25 **Conductance measurements of polar molecules in a nonconducting solvent**
Otey C, Sharma M, Prana J, Czyszczon-Burton TM, Hernandez A, Camarasa-Gómez M, Hernangómez-Pérez D, and Inkpen MS.
ACS Physical Chemistry Au 5, 249 (2025)

26 **Iridium-based time-resolved luminescent sensor for Ba2+ detection**
Aranburu AI, Elorza M, Valle PRG, Pazos A, Brodolin A, Herrero-Gómez P, Barcelon JE, Molina-Terriza G, Monrabal F, Rogero C, Cossío FP, Gómez-Cadenas JJ, Tonnelé C, and Freixa Z.
ACS Sensors 10, 2487 (2025)

27 **Supplementary cementitious materials based on CO2 - capturing periwinkle shell**
Saeed E, Ogundiran MB, Goracci G, Aymonier C, and Dolado JS.
ACS Sustainable Resource Management 2, 2197 (2025)

28 **Uncovering the nanoscopic humidity ingression in multifunctional addivated halide perovskites**
Kazim S, Huang J, Haris MPU, Li X, Shi X, Zhang Z, Berger R, Buffeteau T, Bassani DM, Wang M, and Ahmad S.
Advanced Energy Materials 15, 2403248 (2025)

29 **Emergent magnetic structures at the 2D limit of the altermagnet MnTe**
Cuxart MG, Robles R, Muñiz Cano B, Gargiani P, Rebanal C, Di Bernardo I, Amiri A, Calleja F, Garnica M, Valbuena MA, and Vázquez de Parga A.
Advanced Functional Materials , Early Access (2025)

30 **Peptide-guided self-assembly: fabrication of tailored spiral-like nanostructures for precise inorganic templating**
Alvarez-Fernandez A, Pawar N, Sanchez-Puga P, Zaccai NR, and Maestro A.
Advanced Functional Materials 35, 2411061 (2025)

31 **Tunable magnetism in 2D organic-ion-intercalated MnPS3 via molecule-dependent vacancy generation**
Tezze D, Pereira JM, Tutar D, Ramos M, Regner J, Gargiani P, Schiller F, Casanova F, Alegria A, Martín-García B, Sahin H, Sofer Z, Ormaza M, Hueso LE, and Gobbi M.
Advanced Functional Materials 35, 2412771 (2025)

32 **Decoding the structure of benzodithiophene polymers for high-efficiency organic solar cells**
Sanviti M, Marina S, Rodriguez-Martínez X, Asatryan J, Di Lisio V, Hultmark S, Gutierrez J, Solano E, Rech JJ, Solla EL, You W, Tercjak A, Vázquez ME, Cangialosi D, Müller C, Ade H, and Martin J.
Advanced Functional Materials 35, 2503634 (2025)

33 **Spin-split edge states in metal-supported graphene nanoislands obtained by CVD**
Gastaldo M, Mansouri M, Garcia-Fernandez C, Sánchez-Portal D, Garcia-Lekue A, Ceballos G, and Mugarza A.
Advanced Materials (2025)

34 **A functional 2D carbon allotrope combining nanoporous graphene and biphenylene segments**
Angulo-Portugal P, Irizar M, Huang L, Sarker M, Ashoush MA, El-Fattah ZMA, Barth J, Schiller F, El-Sayed A, Gao F, de Oteyza DG, Sinitskii A, Garcia-Lekue A, Corso M, and Piquero-Zulaica I.
Advanced Materials, e11706 (2025)

35 **Responsive molecules for organic neuromorphic devices: harnessing memory diversification**
Chen Y, Han B, Gobbi M, Hou L, and Samorì P.
Advanced Materials 37, 2418281 (2025)

36 **Anomalous nonlinear magnetoconductivity in van der Waals magnet CrSBr**
Jo J, Suárez-Rodríguez M, Mañas-Valero S, Coronado E, Souza I, de Juan F, Casanova F, Gobbi M, and Hueso LE.
Advanced Materials 37, 2419283 (2025)

37 **Gate-tunable exchange bias and voltage-controlled magnetization switching in a van der Waals ferromagnet**
Sharma M, Avedissian G, Skowroński W, Jo J, Chuvilin A, Casanova F, Gobbi M, and Hueso LE.
Advanced Materials Interfaces 12, 2400678 (2025)

38 **Water permeates and plasticizes amorphous carbon dots: unraveling the inner accessibility of the nanoparticles by glass transition studies**
Sturabotti E, Di Lisio V, Cardo L, Camilli A, Moretón Alfonsín E, Cangialosi D, Iturrospe Ibarra A, Arbe A, and Prato M.
Advanced Materials, e10992 (2025)

39 **Influence of the gap distance and morphology on the plasmon modes of gold nanocube dimers**
Barrio J, Manzorro R, Sánchez-Iglesias A, Rodríguez-San-Miguel D, Coronado-Puchau M, Moreno C, Langer J, Fernández-Domínguez AI, Trasobares S, Liz-Marzán LM, Zamora F, and Juárez BH.
Advanced Optical Materials 13, 2500042 (2025)

40 **Size effect on photothermal heating ability of gold bipyramids**
Naik AM, Sánchez-Iglesias A, Montaño-Priede JL, D'souza NM, Sancho-Parramon J, Mezzasalma SA, Rao A, and Grzelczak M.
Advanced Optical Materials 13, e01006 (2025)

41 **Detection of hybrid optical anapoles in dielectric microspheres**
Manna U, Gómez-Viloria I, Sevik R, Tribaldo I, Biswas M, Molina-Terriza G, and Olmos-Trigo J.
Advanced Optical Materials 13, e01315 (2025)

42 **Peptide-perovskite based bio-inspired materials for optoelectronics applications**
Kazim S, Haris MPU, and Ahmad S.
Advanced Science 12, 2408919 (2025)

43 **Coverage–dependent structural evolution of CoBr2 at the Au(111) interface**
Kerschbaumer S, Ondráček M, Hadjadj SE, Stetsovych O, Pinar Solé A, Candia AE, Angulo-Portugal P, Aguirre-Baños A, Corso M, Serrate D, Lobo-Checa J, Jelínek P, Ilyn M, Piaggi PM, and Rogero C.
Advanced Science 12, e08262 (2025)

44 **A modern roman-inspired concrete with daytime radiative cooling capacity**
Dolado JS, Goracci G, Moutaoukil G, Agbaoye RO, Beruete M, Torres-García AE, Carlosena L, Prabhu A, Ibáñez JA, Adams N, van Lipzig N, and Allacker K.
Advanced Science 12, e11691 (2025)

45 **Effect of Co and Mn doping on the electronic and magnetic properties of XC_2 (X = Hf, Zr) MXene monolayers: a first-principles study**
Bölen E, and Alyörük MD.
Advanced Theory and Simulations 8, e00145 (2025)

46 **Barium ion sensing with IPG K+ molecular probes**
Miller RL et al.
Analyst 150, 5558 (2025)

47 **Tailoring π--d magnetic interactions in metallated porphyrin nanotapes**
Robles R, Edalatmanesh S, Sun Q, Ruffieux P, Fasel R, Mateo LM, Bottari G, Torres T, and Lorente N.
Angewandte Chemie - International Edition 64, e15342 (2025)

48 **N-heterocyclic carbene vs. thiophene - chiral adsorption and unidirectional rotation on Au(111)**
Khera N, Sun N, Park S, Das P, Au-Yeung KH, Sarkar S, Plate F, Robles R, Lorente N, Lissel FSC, and Moresco F.
Angewandte Chemie - International Edition 64, e202424715 (2025)

49 **A comprehensive review of experimental and numerical studies on liquid metal-gas two-phase flows and associated measurement challenges**
Saraswat A, Fraile A, Gedupudi S, Bhattacharyay R, and Chaudhuri P.
Annals of Nuclear Energy 213, 111104 (2025)

50 **Sliding multiple polarization states and controllable anomalous hall conductivity in bilayer MnSb2Se4 with Mn-Sb antisites**
Sun J, Fang Y-W, Niu Z, Zhang Z, Sawyerr F, Wan J, Wang J, Jing X, Yu Y, Shi J, Liu L-M, Fan X, and Cao T.
APL Computational Physics, 1, 026106 (2025)

51 **Optical forces, helicity, angular momentum and how they are all intertwined**
Gómez-Viloria I, García EA, Olmos-Trigo J, Stefano QP, Lasa-Alonso J, Molezuelas-Ferreras M, and Molina-Terriza G.
APL Photonics 10, 51101 (2025)

52 **Mie scattering based measurements of the optical size of single spherical dielectric microparticles**
Tribaldo I, Molezuelas-Ferreras M, Cifuentes I, López C, Fenollosa R, and Molina-Terriza G.
APL Photonics 10, 76103 (2025)

53 **Control of magnetic transition, metal-semiconductor transition, and magnetic anisotropy in noncentrosymmetric monolayer Cr2Ge2Se3Te3**
Wang R-Q, Cao T, Lei T-M, Zhang X, and Fang Y-W.
Applied Physics Letters 127, 92402 (2025)

54 **Perovskite nanocrystals as emerging single-photon emitters: Progress, challenges, and opportunities**
Ryu J, Krivenkov V, Olejniczak A, Nikitin AY, and Rakovich Y.
Applied Physics Reviews 12, 41323 (2025)

55 **Model fitting and analysis of dielectric properties in alcohol–fuel blends using terahertz and gigahertz spectroscopies**
Cova-Bonillo A, Patiño-Camino R, Brinklow G, Lapuerta M, Rodríguez-Fernández J, Melillo JH, and Cerveny S.
Applied Spectroscopy 79, 1056 (2025)

56 **Adsorption and self-assembling of a norbornadiene derivative on Au(1 1 1)**
Sarkar S, Khera N, Ferreira P, Au-Yeung KH, Das P, Robles R, Lorente N, Moth-Poulsen K, and Moresco F.
Applied Surface Science 709, 163744 (2025)

57 **Towards cooling concrete: Evaluation of cement and cement composites under realistic climatic conditions**
Torres-García AE, Agbaoye RO, Carlosena L, Goracci G, Lezaun C, Dolado JS, and Beruete M.
Applied Thermal Engineering 265, 125531 (2025)

58 **Ultrathin water layers on mannosylated gold nanoparticles**
Iriarte Alonso MA, Melillo JH, Cerveny S, Tong Y, and Bittner AM.
Beilstein Journal of Nanotechnology 16, 2183 (2025)

59 **Energy-resolved imaging and tomography with compact neutron systems —application to novel construction materials for thermal-energy storage**
Macia-Castello C, Blanco-Lopez D, Gaboardi M, Koenders E, Dolado JS, Wakabayashi Y, Fukuchi T, Ikeda Y, Otake Y, and Fernandez-Alonso F.
Canadian Journal of Physics 103, 1232 (2025)

60 **Structural characterization of low methoxyl pectin-based adsorbents: the role of water on pectin structure**
Coin F, Larrañaga A, and Cerveny S.
Carbohydrate Polymer Technologies and Applications 11, 100885 (2025)

61 **LED-induced photoactivity of self-supporting chitosan-azobenzene films for light energy harvesting/storage**
Kremer-Seitz C, Castillo P, Tundidor-Camba A, Ramírez O, Bonardd S, Díaz Díaz D, Leiva A, and Saldias C.
Cellulose 32, 2403 (2025)

62 **Thermal properties of tricalcium aluminate: Molecular dynamics simulation and experimental approach**
Sarkar PK, Goracci G, and Dolado JS.
Cement and Concrete Research 189, 107780 (2025)

63 **The investigation of local structure, thermal expansion and thermal conductivity of Cd2Ta2O7**
Bai X, Qin F, Li R, Fang Y-W, Sun J, Ding X, and Hu L.
Ceramics International 51, 53104 (2025)

64 **Low temperature atomic layer deposition of boron nitride using the in situ decomposition of ammonium carbamate**
Álvarez-Yenes A, Koroteev VO, Ryzhikov MR, Ilyn M, Kozlova SG, and Knez M.
Chemical Communications 61, 11774 (2025)

65 **Single-bond dual dynamics: Temperature-gated associative and dissociative exchange of disulfides in a sustainable covalent adaptable network**
Guerrero-Ruiz F, Otaegi I, Verde-Sesto E, and Maiz J.
Chemical Engineering Journal 525, 170122 (2025)

66 **Anthracene-functionalized dipolar glass copolymers as precursors for high-dielectric single-chain nanoparticles**
Bonardd S, Maiz J, Maisueche J, Verde-Sesto E, and Pomposo JA.
Chemical Science 16, 19898 (2025)

67 **Synthesis and characterization of a non-planar cyclophenylene on Au(111)**
Salaverria S, Irizar M, Janeiro J, Angulo-Portugal P, Wang T, Patrick Calupitan J, Rodríguez-Fernández J, Garcia-Lekue A, Corso M, Artacho E, Peña D, Pérez D, and de Oteyza DG.
Chemistry - A European Journal 31, e202404256 (2025)

68 **Influence of poly(vinylpyrrolidone) synthesis conditions on the formation of gold nanostars**
Wagner M, Herrero-Ruiz A, Verde-Sesto E, Asenjo-Sanz I, and Liz-Marzán LM.
Chemistry of Materials 37, 644 (2025)

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BOOK CHAPTERS

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Marek Grzelczak
Chapter 2
Aranzadi

APPENDIX II
COMPETITIVE RESEARCH PROJECTS
ONGOING IN 2025

EUROPEAN AND INTERNATIONAL RESEARCH PROJECTS

Funded by the European Union

- ERC Starting Grant (ERC-2021-STG), GA 101040193.

  COSAS: Controlling oxygen selectivity at the atomic scale.

  IP: Sara Barja Martínez

- ERC Starting Grant (ERC-2020-STG), GA 946629.

  PhotoNow: Discovery and Characterization of Third-Generation Nonlinear Photovoltaics

  IP: Julen Ibañez Azpiroz

- ERC Synergy Grant (ERC-2020-SyG), GA 951281.

  BOLD: A background-free experiment to discover the nature of neutrinos based on single Barium Atom Light Detection

  IP: Celia Rogero Blanco

- ERC Starting Grant (ERC-2018-STG), GA 802533.

  SuperH: Discovery and Characterization of Hydrogen-Based High-Temperature Superconductors

  IP: Ion Errea Lope

- HORIZON EUROPE Pathfinder Challenges (HORIZON-EIC-2024-PATHFINDERCHALLENGES-01), GA 101223135.

  C-SINC: Concrete products through sustainable and innovative carbon-storing binders

  IP: Maite Alducin Ochoa

- HORIZON EUROPE Pathfinder Open (HORIZON-EIC-2023-PATHFINDEROPEN-01-01), GA 101130224.

  JOSEPHINE: High-TC Josephson Neurons and Synapses: Towards Ultrafast and Energy Efficient Superconducting Neuromorphic Computing

  IP: Sebastian Bergeret Sbarbaro

- HORIZON EUROPE Research infrastructure services to support health research, accelerate the green and digital transformation, and advance frontier knowledge (HORIZON-INFRA-2023-SERV-01-01), GA 101130652.

  RIANA: Research Infrastructure Access in NAnoscience & nanotechnology

  IP: Silvina Cerveny Murcia

- HORIZON EUROPE Booster (HORIZON-EIC-2023-BOOSTER-IBA-01), GA 101164420.

  COOLCRETE: Radiative COOLing conCRETE

  IP: Jorge Sánchez Dolado

- HORIZON EUROPE Cluster 5 (HORIZON-CL5-2021-D3-03-10), GA 101084348.

  NATURSEA-PV: novel eco-cementitious materials and components for durable, competitive, and bio-inspired offshore floating pv substructures

  IP: Jorge Sánchez Dolado

- HORIZON EUROPE Pathfinder Open (HORIZON-EIC-2021-PATHFINDEROPEN-01), GA 101046364.

  ESiM: Energy Storage in Molecules

  IP: Nicolás Lorente Palacios

- FET-OPEN: Novel Ideas for Radically New Technologies (FETOPEN-01-2018-2019-2020), GA 964450.

  MIRACLE: Photonic Metaconcrete with Infrared RAdiative Cooling capacity for Large Energy savings

  IP: Jorge Sánchez Dolado

- MSCA Postdoctoral Fellowship (HORIZON-MSCA-2024-PF-01-01), GA 101211150.

  SIMILAR: Single Chain Nanoparticles as SImplified Models of Intrinsically Disordered Proteins in CompLex CoAceRvates

  Postdoctoral researcher: Purushottam Dubey
  Supervisor: Paula Malo de Molina Hernández

- MSCA Postdoctoral Fellowship (HORIZON-MSCA-2022-PF-01), GA 101106809.

  CavityMag: Cavity quantum electrodynamics control of magnetic phases in twisted van der Waals heterostructures

  Postdoctoral researcher: Emil John Erik Viñas Bostrom
  Supervisor: Ángel Rubio Secades

- MSCA Doctoral Networks (HORIZON-MSCA-2021-DN-01), GA 101072964.

  QLUSTER: Quantum and Classical Ultrasoft Matter

  IP: Angel Moreno Segurado

- COST Action 2024, CA23111.

  SNOOPY: Searching for Nanostructured or pOre fOrming Peptides for therapY

  IP: Ivan Sasselli Ramos

- COST Action 2021, CA20116.

  OPERA: European Network for Innovative and Advanced Epitaxy

  IP: Sara Barja Martínez

- INT-NOCORE 2024, SFI-MPS-NFS-00006741-10.

  Simons Collaboration on New Frontiers in Superconductivity

  IP: Ion Errea Lope

- ONR Global basic and applied scientific research grant, N62909-22-1-2031.

  Microspherical Superlens Windows to the Quantum World

  IP: Yury Rakovich

SPANISH RESEARCH PROJECTS

- MICIU, Proyectos de Generación de Conocimiento 2024, PID2024-157277NA-I00.

  TACOS: Tailoring Bottlebrush Polymer Architectures and Confinement Strategies for the Development of Advanced Energy Materials.

  PIs: Jon Maiz Sancho, Alberto Álvarez Fernandez

- MICIU, Proyectos de Generación de Conocimiento 2024, PID2024-157988NB-I00.

  SOFT-TONIC: Topology in Self-Assembled SOFT Materials: Networks, Interfaces and Confinement.

  PIs: Armando Maestro Martín, Josetxo Pomposo Alonso
  Predoctoral grant associated

- MICIU, Proyectos de Generación de Conocimiento 2024, PID2024-159071NA-I00.

  BIOPON: Biophysical Insights into Coacervates via Polypeptide Nanoparticles.

  PI: Paula Malo de Molina

- MICIU, Proyectos de Generación de Conocimiento 2024, PID2024-159869NA-I00.

  OPTIMIA: Artificial Intelligence-Driven Optimization of Nanostructure Optical Properties.

  PI: María Camarasa Gómez

- MICIU, Proyectos de Generación de Conocimiento 2024, PID2024-160158OA-I00.

  ProVERSe: Probe for Versatile Electron Resonance Sensing.

  PI: Rubén Pellicer Guridi

- MICIU, Proyectos de Generación de Conocimiento 2024, PID2024-160189NA-I00.

  MNEMOTEQ: Magnetic Interfaces for New Superconducting Memories and Quantum Technologies.

  PI: Sara Catalano

- MICIU, Proyectos de Generación de Conocimiento 2023, PID2023-146348NB-I00.

AQUACARE: Advanced Adsorbents based on nanotechnology and artificial intelligence for Quality and Cleaning of aquatic resource.

PI: Silvina Cerveny Murcia
Predoctoral grant associated

- MICIU, Proyectos de Generación de Conocimiento 2023, PID2023-146442NB-I00.

TUNA: Towards Tunable Nanoporous Assemblies - Emerging Opportunities for Carbon-based Molecular Materials.

PI: Félix Fernández Alonso
Predoctoral grant associated

- MICIU, Proyectos de Generación de Conocimiento 2023, PID2023-147324NA-I00.

NanoLIGHT: Light harvesting in transition-metal dichalcogenide nanostructures.

PIs: Julen Ibañez Azpiroz, Daniel Hernangomez Pérez

- MICIU, Proyectos de Generación de Conocimiento 2023, PID2023-147466OB-C22.

GREEN-BEAMS: Activation of Greenhouse Gases for Clean Energy Applications: A Combined Molecular Beams and XPS Approach.

PI: Enrique Ortega Conejero

- MICIU, Proyectos de Generación de Conocimiento 2023, PID2023-148225NB-C31.

SUNRISE: Fabrication of Hybrid Heterostructures and Theory of the Electronic Transport for Superconducting Spintronics.

PI: Sebastián Bergeret Sbarbaro

- MICIU, Proyectos de Generación de Conocimiento 2023, PID2023-149158OB-C44.

Aigap: Advance Instrumentation for bridging the pressure GAP.

PIs: Sara Barja Martínez, Frederik Michael Schiller

- MICIU, Proyectos de Generación de Conocimiento 2022, PID2022-136392NA-I00.

ArtEMis: Impulsando la Optimización de Ensamblajes Peptídicos Supramoleculares como Matrices Extracelulares Artificiales.

PI: Ivan Sasselli Ramos

- MICIU, Proyectos de Generación de Conocimiento 2022, PID2022-137363OA-I00.
  NeuroGold: Photothermal gold nanostructures for neural activity modulation.
  PI: Ane Escobar Fernández

- MICIU, Proyectos de Generación de Conocimiento 2022, PID2022-137685NB-I00.
  CompuMaBo: Metodologías Computacionales para Problemas de Muchos Cuerpos en Física de la Materia Condensada: Vibraciones, Magnetismo y Alta Correlación.
  PI: Andrés Arnau Pino

- MICIU, Proyectos de Generación de Conocimiento 2022, PID2022-137845NB-C22.
  Photonic Metaconcrete with Photothermoelectric capacity.
  PIs: Jorge Sánchez Dolado, Juan José Gaitero Redondo

- MICIU, Proyectos de Generación de Conocimiento 2022, PID2022-138750NB-C22.
  2D-HITS-MP: Enabling magnetic 2D hybrid heterostructures - Mesoscopic perspective.
  PI: Maxim Ilin

- MICIU, Proyectos de Generación de Conocimiento 2022, PID2022-139230NB-I00.
  EIEEDyNaCoS: Exploring the Interplay of Electronic Excitations and Dynamics in Nanostructures and Complex Systems.
  PIs: Andrés Ayuela Fernández, Silkin Vyacheslav

- MICIU, Proyectos de Generación de Conocimiento 2022, PID2022-139579NB-I00.
  QuEVEDO: Tratamiento cuántico de la interacción de excitones y vibraciones moleculares con nanoresonadores ópticos: fluorescencia, dinámica electrónica ultrarrápida y optomécanica.
  PI: Ruben Esteban Llorente

- MICIU, Proyectos de Generación de Conocimiento 2022, PID2022-140163NB-I00.
  TADEO: Theory and Applications of complex gas/surface Dynamics in highly Excited envirOnments.
  PI: Maite Alducin Ochoa

- MICIU, Proyectos de Generación de Conocimiento 2022, PID2022-140845OB-C65.

  ChemSense: Chemical, electronic and optical characterisation of atomically precise molecular architectures for sensing applications.

  PI: Martina Corso

- MICIU, Proyectos de Generación de Conocimiento 2022, PID2022-141017OB-I00.

  PREST: Data-Driven Approach for Accelerating Pulsed Plasmonic Catalisis.

  PI: Marek Grzelczak
  Predoctoral grant associated

- MICIU, Proyectos de Generación de Conocimiento 2022, PID2022-142861NA-I00.

  SUPERTRANS: Propiedades vibracionales complejas a partir de cálculos ab initio: superconductividad de alta temperatura, transiciones de fase y transporte térmico.

  PI: Ion Errea Lope

- MICIU, Proyectos de Generación de Conocimiento 2022, PID2022-143268NB-I00.

  HeliForces: Control de las fuerzas ópticas con haces helicoidales

  Controlling optical forces with helical beams.

  PI: Gabriel Molina Terriza

- MICIU, Proyectos de Generación de Conocimiento 2021, PID2021-123438NB-I00.

  DYNANET: Dynamic Networks in Soft Matter: From Small Molecules to Complex Polymers.

  PIs: Angel Moreno Segurado, Josetxo Pomposo
  Predoctoral grant associated

- MICIU, Proyectos de Generación de Conocimiento 2021, PID2021-127917NB-I00.

  MAMI: Molecules As Magnetic Impurtities for quantum technologies.

  PIs: Deung-Jang Choi, Nicolás Lorente Palacios

- MICIU, Proyectos de Generación de Conocimiento 2021, PID2021-129035NB-I00.

  HigherOrder: Ab initio theory of higher-order transport and optical responses in crystals.

  PIs: Ivo Souza, Stepan Tsirkin

- MICIU, Proyectos de Generación de Conocimiento 2021, PID2021-129054NA-I00.

  BIOINTER: Rational design of biological interfaces: From fundamental questions to applications in drug delivery.

  PI: Armando Maestro Martín

- MICIU, Proyectos de I+D+i de Generación de Conocimiento 2020, PID2020-114506GB-I00.

  HYPER: Facing the Hybrid-Perovskite Challenge - New Insights Into the Stability, Degradadation and Performance of Next-Generation Photovoltaic & Photonic Materials.

  PI: Félix Fernández Alonso
  Predoctoral grant associated

- MICIU, Proyectos Estratégicos Orientados a la Transición Ecológica y a la Transición Digital, TED2021-129457B-I00.

  MACMAT: Materiales metaestables y activos basados en el carbono para el almacenamiento y gestión de energías límpias: nuevas estrategias físico-químicas.

  PIs: Félix Fernández Alonso, Pedro Braña Coto

- MICIU, Proyectos Estratégicos Orientados a la Transición Ecológica y a la Transición Digital, TED2021-130292B-C42.

  NEMATODE: Developing new materials for hybrid quantum devices.

  PIs: Celia Rogero Blanco, Sebastian Bergeret Sbarbaro

- MICIU, Proyectos Estratégicos Orientados a la Transición Ecológica y a la Transición Digital, TED2021-132074B-C31.

  PCES: Hormigón fotónico para soluciones medioambientales.

  PIs: Jorge Sánchez Dolado, Juan José Gaitero Redondo

- MICIU, Proyectos Estratégicos Orientados a la Transición Ecológica y a la Transición Digital, TED2021-132074B-C32.

  RePro-PCES: Response Properties of Photonic Concrete for Environmental Solutions.

  PI: Andrés Ayuela Fernández

- MICIU, Redes Investigación 2022 - Red Temática, RED2022-134508-T.

  CAT&SCALE: (Foto-)Electrocatalisis: de la escala atomica a dispositivos avanzados.

  PI: Sara Barja Martínez

- MICIU, Ayudas para contratos Ramón y Cajal 2023, RYC2023-042940-I.

  Exploring the electronic properties of single-atom-thick molecular and graphene-based nanostructures on surfaces in UHV conditions.

  PI: Ignacio Piquero Zulaica

- MICIU, Ayudas para contratos Ramón y Cajal 2023, RYC2023-044021-I.

  Democratizing advanced medical instrumentation.

  PI: Rubén Pellicer Guridi

- MICIU, Ayudas para contratos Ramón y Cajal 2023, RYC2023-044285-I.

  Structure and Dynamics of Polar Polymers and Vitrimers-based Materials for Energy: Insights from Neutron Scattering and Dielectrics, and Other Complementary Experimental Methods.

  PI: Jon Maiz Sancho

- MICIU, Ayudas para contratos Ramón y Cajal 2022, RYC2022-037590-I.

  Development of innnovative functional polymeric materials. Design and synthesis of "smart" single chain nanoparticles.

  PI: Ester Verde Sesto

- MICIU, Ayudas para contratos Ramón y Cajal 2021, RYC2021-031705-I.

  Advanced materials for spin- and opto-electronics.

  PI: Marco Gobbi

- MICIU, Ayudas para contratos Ramón y Cajal 2021, RYC2021-033294-I.

  Amphiphilic peptides for the development of supramolecular polymers.

  PI: Ivan Sasselli Ramos.

- MICIU, Ayudas para contratos Juan de la Cierva 2022, JDC2022-048665-I.

  Magnetic and transport properties of pi-conjugate graphene-like nanostructures.

  Postdoctoral researcher: Sofia Sanz Wuhl

- MICIU, Ayudas para contratos de Personal Técnico de Apoyo 2024, PTA2024-024487-I.

  Apoyo técnico al laboratorio del grupo Quantum Beams and sustainable Materials del CFM.

  Lab technician: Daniel Blanco López

- MICIU, Ayudas para contratos de Personal Técnico de Apoyo 2022, PTA2022-021877-I.

  Apoyo técnico al Servicio TIC avanzado en el ámbito I+D+i del CFM

  Lab technician: Mikel Arocena Errazquin

- MICIU, Ayudas para contratos de Personal Técnico de Apoyo 2021, PTA2021-020084-I.

  Apoyo técnico al laboratorio del grupo Ceramic and Cement based Materials para el desarrollo de Photonic Metaconcrete y Thermoelectric Concrete del CFM.

  Lab technician: Guido Goracci

- MICIU, Ayudas para contratos de Personal Técnico de Apoyo 2021, PTA2021-021175-I.

  Apoyo técnico al laboratorio del grupo Polymers and Soft Matter para la especialidad de cromatografía líquida para la caracterización de materiales del CFM.

  Lab technician: Isabel Asenjo Sanz

- MICIU, Programa de formación de profesorado universitario (FPU) 2021, FPU21/02963.

- CSIC, Programa de Apoyo a la Infraestructura (FAS) 2025, FAS2025_039.
  Sistema de frío para los calorímetros del servicio de calorimetría del CFM.

- CSIC, Programa de cooperación bilateral CONICET – CSIC 2024, BILAT23076.
  WATER-HEALTH: Multi-adsorbentes de arsénico y contaminantes emergentes desarrollados a partir de sales de hierro y residuos de biomasa agrícola (cáscara de soja).
  PI: Silvina Cerveny Murcia

- CSIC, ImpulsaT 2023, IMPUL23009.
  PHOTOCRETE: Hormigón fotónico con capacidad de enfriamiento radiactivo diurno.
  PI: Jorge Sánchez Dolado

- CSIC, JAE-PRE 2023, JAEPR23046.
  Short Peptide Induced Gelation of Electrostatically Charged Supramolecular Assemblies.
  PI: Ivan Sasselli Ramos

BASQUE RESEARCH PROJECTS

- EJ/GV, Zientzia, Unibertsitate eta Berrikuntza Saila / Departamento de Ciencia, Universidades e Innovación, Ayudas para la adquisición de equipamiento científico 2025 (INKER), EC_2025_1_0007

  Cámara de preparación de muestras

  PI: Deung-Jang Choi

- EJ/GV, Zientzia, Unibertsitate eta Berrikuntza Saila / Departamento de Ciencia, Universidades e Innovación, Proyectos de Investigación Básica y/o Aplicada 2025-2027 (PIBA), PIBA_2025_1_0018

  SPRINTEQ-Superconducting Hybrid Interfaces for Quantum Technologies

  PI: Sara Catalano

- EJ/GV, Zientzia, Unibertsitate eta Berrikuntza Saila / Departamento de Ciencia, Universidades e Innovación, Proyectos de Investigación Básica y/o Aplicada 2024-2026 (PIBA), PIBA_2024_1_0008

  Diseño de nuevas fases de la materia con manipulación atómica de estructuras híbridas en superconductores.

  PI: Deung-Jang Choi

- EJ/GV, Zientzia, Unibertsitate eta Berrikuntza Saila / Departamento de Ciencia, Universidades e Innovación, Proyectos de Investigación Básica y/o Aplicada 2024-2026 (PIBA), PIBA_2024_1_0011

  Materiales Innovadores en Tratamiento de Aguas: Síntesis, Caracterización y Funcionalidad (MAiTe-URA)

  PI: Lucia Vitali

- EJ/GV, Zientzia, Unibertsitate eta Berrikuntza Saila / Departamento de Ciencia, Universidades e Innovación, Proyectos de Investigación Básica y/o Aplicada 2023-2025 (PIBA), PIBA_2023_1_0006

  Desarrollo y caracterización de materiales micro-nano-estructurados activados con colorantes orgánicos y/o tierras raras para la elaboración de láseres aleatorios con aplicaciones optoelectrónicas

  PI: Rolindes Balda de la Cruz

- EJ/GV, Zientzia, Unibertsitate eta Berrikuntza Saila / Departamento de Ciencia, Universidades e Innovación, Proyectos de Investigación Básica y/o Aplicada 2023-2025 (PIBA), PIBA_2023_1_0054

  Design of intelligent drug delivery systems based on polymer nanoparticles for overcoming cellular membrane barriers

  PI: Armando Maestro Martín

- EJ/GV, Zientzia, Unibertsitate eta Berrikuntza Saila / Departamento de Ciencia, Universidades e Innovación, Ayudas para el Programa Predoctoral de Formación de Personal Investigador No Doctor correspondiente al curso 2024-2025.

  4 ayudas para la contratación de personal investigador predoctoral.

- EJ/GV, Ekonomiaren Garapen, Jasangarritasun eta Ingurumen Saila / Departamento de Desarrollo Económico, Sostenibilidad y Medio Ambiente, ELKARTEK 2025, KK-2025/00107

  BETISENS: Sensórica avanzada para aplicaciones de altas prestaciones para composición química y magnetometría

  PI: Gabriel Molina Terriza

- EJ/GV, Zientzia, Unibertsitate eta Berrikuntza Saila / Departamento de Ciencia, Universidades e Innovación, IKERTALDE 2022, Grupo Consolidado, IT1526-22

  Q-NANOFOTONIKA : Nanofotónica para la identificación y desarrollo de nuevos procesos y aplicaciones en espectroscopías moleculares, microscopía de campo cercano y tecnologías cuánticas con fotones.

  PI: Javier Aizpurua Iriazabal; Co-PI: Nerea Zabala Unzalu

- EJ/GV, Zientzia, Unibertsitate eta Berrikuntza Saila / Departamento de Ciencia, Universidades e Innovación, IKERTALDE 2022, Grupo Consolidado, IT1566-22

  Polimeros y Materia Blanda / Polymers and Soft Matter (PSMG)

  PI: Arantxa Arbe Méndez; Co-PI: Angel Alegria Loinaz

- EJ/GV, Zientzia, Unibertsitate eta Berrikuntza Saila / Departamento de Ciencia, Universidades e Innovación, IKERTALDE 2022, Grupo Consolidado, IT1569-22

  Grupo de Fisicoquímica de Superficies y Nanoestructuras

  PI: Iñaki Juaristi Oliden

- EJ/GV, Zientzia, Unibertsitate eta Berrikuntza Saila / Departamento de Ciencia, Universidades e Innovación, IKERTALDE 2022, Grupo Consolidado, IT1591-22

  Nanophysics Lab San Sebastian: desde la ciencia de superficies a los dispositivos

  PI: Celia Rogero Blanco; Co-PI: Enrique Ortega Conejero

- EJ/GV, Zientzia, Unibertsitate eta Berrikuntza Saila / Departamento de Ciencia, Universidades e Innovación, IKERTALDE 2022, Grupo Consolidado, IT1707-22

  From Protein Folding Prediction To Personalized Medicine With Artificial Intelligence

  PI: Aitor Bergara Jauregi

- Euskampus Fundazioa, LTC Green Concrete: Joint Transborder Laboratory for the development of more sustainable production processes and materials for cement composites.

  Co-coordinator: Jorge Sánchez Dolado

- Euskampus Fundazioa, LTC QuantumChemPhys: Joint Transborder Laboratory in Theoretical Chemistry and Physics at the Quantum Scale.

  Co-coordinator: Ricardo Diez Muiño

- Euskampus Fundazioa, LTC TRANSLIGHT: Joint Transborder Laboratory in Light sciences and Photonics.

  Co-coordinator: Javier Aizpurua Iriazabal

- Gipuzkoako Foru Aldundia / Diputación Foral de Gipuzkoa, SAREA2025-RED2025, Proyectos de I+D, 2025-CIE4-000037-01

  ZWIT-CEL: Superando Barreras: Nanopartículas Poliméricas Zwitteriónicas para la Administración Dirigida de Terapias Celulares

  PI: Armando Maestro Martín

- Gipuzkoako Foru Aldundia / Diputación Foral de Gipuzkoa, Gipuzkoa Red: inversiones 2025, 2025-CIE3-000014-01

  FOTON-X: Instrumentación para explorar la interacción luz-materia a escala atómica

  PI: Celia Rogero Blanco; Co-IP: Martina Corso

- Gipuzkoako Foru Aldundia / Diputación Foral de Gipuzkoa, SAREA2024-RED2024, Proyectos de I+D, 2024-CIE4-000014-01

  Impacto de la TOpología MAcromolecular en la estructura de Complejos coacervados

  PI: Paula Malo de Molina; Co-IP: Ester Verde Sesto

- Gipuzkoako Foru Aldundia / Diputación Foral de Gipuzkoa, Gipuzkoa QUANTUM 2025, 2025-QUAN-000013-01

  Strategic Initiative for the development of new Twistable Quantum Materials

  PI: Sara Barja Martínez

- Gipuzkoako Foru Aldundia / Diputación Foral de Gipuzkoa, Gipuzkoa QUANTUM 2025, 2025-QUAN-000022-01

  GAITSEN: GAitz eta Isuriak Topatzeko SEntsore kuantiko uNibertsala – Detector cuántico universal para la detección de enfermedades y vertidos

  PI: Gabriel Molina Terriza

- Gipuzkoako Foru Aldundia / Diputación Foral de Gipuzkoa, Gipuzkoa QUANTUM 2025, 2025-QUAN-000041-01

  AQUAS: Investigación en simulación cuántica avanzada / Advanced Quantum Simulation

  PI: Andrés Ayuela Fernández

- Gipuzkoako Foru Aldundia / Diputación Foral de Gipuzkoa, Gipuzkoa QUANTUM 2024, 2024-QUAN-000014-01

  SUPERINT: Superconductividad no convencional y uniones de Josephson ultradelgadas en compuestos de intercalación

  PI: Marco Gobbi

- Gipuzkoako Foru Aldundia / Diputación Foral de Gipuzkoa, Gipuzkoa QUANTUM 2024, 2024-QUAN-000018-01

  ESRPiN- Resonancia magnética nuclear potenciada cuánticamente

  PI: Rubén Pellicer Guridi

- Gipuzkoako Foru Aldundia / Diputación Foral de Gipuzkoa, Fellows Gipuzkoa 2025 – Atracción (Year 1), 2025-FELL-000013-01

  Control de la Materia Dinámicamente Desordenada para la Transición Energética

  PI: Umbertoluca Ranieri

- Gipuzkoako Foru Aldundia / Diputación Foral de Gipuzkoa, Fellows Gipuzkoa 2025 – Retención (Year 3), 2025-FELL-000008-01 (new grant obtained in 2023)

  Ingeniería de arquitecturas mesoporosas a través del autoensamblaje de copolímeros de bloque para la fabricación de biosensores electroquímicos

  PI: Alberto Álvarez Fernández

- Gipuzkoako Foru Aldundia / Diputación Foral de Gipuzkoa, Fellows Gipuzkoa 2025 – Retención (Year 2), 2025-FELL-000009-01 (new grant obtained in 2024)

  OPTIC-IA - Propiedades Ópticas Emergentes en Sistemas de Baja Dimensionalidad con Inteligencia Artificial

  PI: María Camarasa Gómez

- Gipuzkoako Foru Aldundia / Diputación Foral de Gipuzkoa, Fellows Gipuzkoa 2024 – Retención (Year 3), 2024-FELL-000003-01 (new grant obtained in 2022)

  Nanopartículas fototérmicas de oro biofuncionalizadas para su retención en la membrana de neuronas y evocar potenciales de acción

  PI: Ane Escobar Fernández

- Gipuzkoako Foru Aldundia / Diputación Foral de Gipuzkoa, Gipuzkoa Coopera 2024, 2024-IZEN-000005-01

  Ellas investigan X: Afrikar emakume ikertzaile batek CFMn egonaldi bat egiteko laguntza / Ellas investigan X: Ayuda para estancia de investigación de una investigadora africana en el CFM

- Gipuzkoako Foru Aldundia / Diputación Foral de Gipuzkoa, Gipuzkoa Coopera 2023, 2023-IZEN-000010-01

  Ellas investigan IX: Afrikar emakume ikertzaile batek CFMn egonaldi bat egiteko laguntza / Ellas investigan IX: Ayuda para estancia de investigación de una investigadora africana en el CFM

- Donostia Sustapena / Fomento San Sebastián, Mujeres Investigadoras 2022.

  Synthesis and electronic structure of one-atom-thick hexagonal boron nitride on curved crystals: toward boron nitride nanostripes

  PI: Alaa Mohammed

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