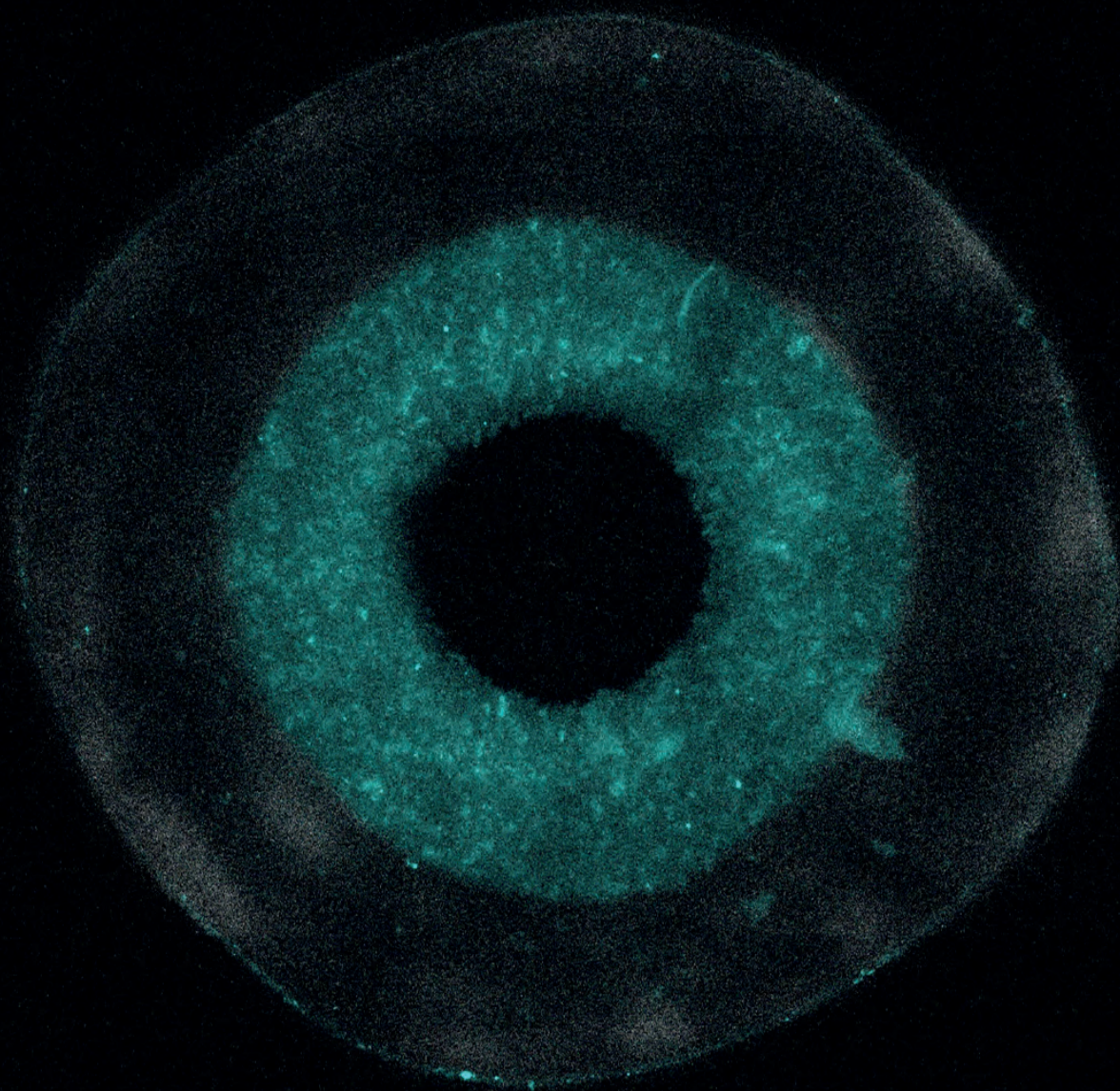


CICbiomaGUNE

MEMBER OF BASQUE RESEARCH
& TECHNOLOGY ALLIANCE

2024

Activity Report



1000 μm

ACTIVITY REPORT 2024

Picture Credits:

3D Printed Eye by Uxue Aizarna
(Hybrid Biofunctional Materials Lab),
Winner of the 1st Prize of the
2024 CIC biomaGUNE Scientific Photo Contest.

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SUMMARY

This report highlights CIC biomaGUNE's main accomplishments in research, technological development, innovation, and international positioning throughout 2024. The excellent results achieved reflect the talent, dedication, and collaborative spirit of our researchers, as well as the essential support provided by our technical and management teams. Together, they continue to consolidate CIC biomaGUNE's role as a leading international research center in the field of biomaterials and nanomedicine.

From left to right:
Anna Llanes Pallàs (General Manager),
Aitziber L. Cortajarena (Scientific Director)
and José M. Mato (Director General).

In 2024, we continued to implement our **Strategic Plan 2022–2025**, structured around five strategic objectives: 1) Scientific Excellence, 2) Talent Recruitment, Training, and Career Development, 3) International Leadership, 4) Technology Transfer and Innovation, and 5) Science Communication and Open Science. This Plan aligns with **Horizon Europe**, the **Spanish Strategy for Science, Technology and Innovation**, and the **Basque 2030 Science, Technology and Innovation Plan (2030 STIP)**, as well as reflecting our commitment to **10 of the 17 United Nations Sustainable Development Goals (SDGs)**.

CIC biomaGUNE's scientific project was strengthened with the recruitment of **Dr. Natalia Baranova**, who leads the *Bottom-up Cell Biology and Bioengineering Laboratory*. Her work aims to uncover the mechanistic understanding of key bacterial

physiology processes, opening new avenues for therapeutic strategies targeting bacterial pathogens.

The center continued to grow in R&D activity, securing **50 new projects** totaling over **€8.5 million** in funding, including public grants and industrial contracts. Private funding alone reached **€2.3 million**, underscoring our commitment to technology transfer and collaboration with industry.

In terms of **infrastructure and resources**, we strengthened our technological platforms and preclinical facilities through a robust investment plan. Notable acquisitions in 2024 include a **multimodal imaging system for preclinical use** (Basque Government), a **Raman microscope for biological samples** (Provincial Council of Gipuzkoa), and a **state-of-the-art MALDI-TOF system** for the Mass Spectrometry Platform.



Scientific production remained strong, with **133 publications** in high-impact journals and **over 11,233 citations**. Our research involved **40% international, 40% national, and 20% internal collaborations**, addressing critical health challenges such as **cancer, Parkinson's, Alzheimer's, ischemia, heart disease, and spinal cord injuries**. This work has been carried out in collaboration with prestigious universities, hospitals, and industry partners worldwide.

Technology transfer and innovation efforts have led to the validation of **five new technologies**, some now progressing toward spin-off creation. A major milestone was the **launch of the spin-off TALDEKI BIOSOLUTIONS**, based on research by Prof. Aitziber Cortajarena. The company specializes in hybrid technologies for molecular recognition.

In the same period, we filed **6 priority patent applications**, had **2 patents granted**, registered **2 trade secrets**, and licensed **3 trade secrets**. We also signed **6 technology transfer agreements** and executed **18 service and research contracts** with companies and institutions.

At the European level, CIC biomaGUNE further consolidated its presence by securing **one ERC Proof of Concept grant, five MSCA actions, and two EIC Pathfinder projects** under Horizon Europe. Our researchers continued to play leadership roles globally, serving on **over 25 editorial boards, 32 scientific advisory boards**, and being invited as **keynote or plenary speakers in more than 30 international conferences**, while also organizing **14 scientific workshops and events** during the year.

Recognition of academic excellence included International recognition of academic excellence is also reflected by prestigious awards. **Prof. Luis M. Liz-Marzán** was appointed as an **International Member of the Accademia dei Lincei**, **Prof. Maurizio Prato** received the **Raffaele Piria Medal** from the Italian Chemical Society, and **Dr. Jordi Llop** was named **President of the European Society for Molecular Imaging (ESMI)**. Dr. Llop was also a **finalist in the Manuel Laborde Awards for Entrepreneurship**. In addition, **young researchers received numerous recognitions**. For instance, **Cristina Simó Costa** was awarded **Best Doctoral Thesis by ESMI** and several team members won best oral or poster presentation awards at scientific events.

Our team maintained an average of **176 staff members**, with a strong **gender balance (61% women)** and an **international profile (29% foreign personnel)**. We sustained parity across research stages, including PhD students, postdocs, and research fellows. In terms of training, the center supported **47 postdoctoral and 65 predoctoral researchers**, with **21 PhD theses completed in 2024**.

We also strengthened our science communication and outreach efforts, with **545 media impacts** and **23 outreach activities** organized, including visits by school and university students, particularly focused on **promoting STEAM careers for girls** and **enhancing the visibility of women in science**.

A particularly distinctive initiative this year was the **collaboration with VERSACE**, which resulted in a unique editorial project showcasing **electron microscopy images of gold nanoparticles** developed in Prof.

Liz-Marzán's lab. This initiative bridged science and art and highlighted the aesthetic beauty of nanoscience.

As part of our continued commitment to **equality, work-life balance, and responsible research practices**, we have advanced several initiatives, including **awareness campaigns, flexible work arrangements**, and the **approval of CIC biomaGUNE's second Equality and Diversity Plan**.

In terms of **responsible consumption and recycling**, we have continued to enhance the **energy-saving measures** implemented in 2022, resulting in a measurable **reduction in CO₂ emissions**.

We have also **outsourced specific services** (such as laboratory coat cleaning, marketing, and catering) to **special employment centers**, supporting the inclusion of **people with disabilities**.

Finally, in line with our strategy to achieve **research excellence**, CIC biomaGUNE has **renewed its R&D management system certification** under the **UNE 166002:2021 standard**.

None of these achievements would have been possible without the enthusiasm, creativity, and dedication of the people who make up CIC biomaGUNE. We hope that this report conveys both the strength of our achievements and the ambition of our vision for the future.

Aitziber L. Cortajarena, Scientific Director
Anna Llanes Pallàs, General Manager
José M. Mato, Director General



PRESENTATION



CIC biomaGUNE building

The Center for Cooperative Research in Biomaterials (CIC biomaGUNE), member of the **Basque Research and Technology Alliance (BRTA)**, is a non-profit research organization created to promote scientific research and technological innovation at the highest levels in the Basque Country following the BioBasque policy, to help create a new business sector based on biosciences.

Located in the Science and Technology Park of Gipuzkoa (Donostia/San Sebastián), the activity of CIC biomaGUNE is conducted by 11 international and dynamic [research groups](#), which develop high-level research at the interface between chemistry, physics, and biology, with a particular emphasis on the design of nanostructures and biomaterials with defined properties, and their applications in biomedicine.

The scientific strategy of the Center is structured around three main research priorities: **Biofunctional Nanomaterials, Synthetic Bioengineering, and Molecular and Functional Imaging**.

The main research lines focus on the design, preparation, and characterization of biofunctional nanostructures and custom biomaterials and their evaluation in *in vitro* and *in vivo* settings, to understand biological processes and develop biomedical tools. These applications include diagnostic, therapeutic, theranostic, or multimodal imaging, to better understand diseases, and ultimately apply them in clinical diagnosis and therapy.

To carry out this ambitious program of research, the Center counts with a unique research infrastructure, equipped with advanced nanoscience, chemistry, biochemistry, cell biology, and molecular imaging facilities, including fully equipped research laboratories, [Technological Platforms](#) and the [Molecular and Functional Imaging Facility](#), selected as a part of a Singular Scientific and Technical Infrastructure (ICTS) by the Spanish Government and one of the most complete preclinical imaging research infrastructures in Europe.

CIC biomaGUNE started its activity in December 2006. José M. Mato is the Director General of CIC biomaGUNE since its inception in 2003. The scientific activity started under the direction of Manuel Martín-Lomas, who took the responsibility of shaping the identity of the Center. After an initial phase where the first research teams were selected from the international scientific community, the Molecular and Functional Imaging Facility was built and soon approved as a National Facility by the Spanish Government in 2010. Luis M. Liz-Marzán took over the Scientific Directorate from Manuel Martín-Lomas, starting this activity in January 2013 until December 2021. Since January 2022, Aitziber L. Cortajarena is the Scientific Director of CIC biomaGUNE.

The Center has obtained national and international recognition as a scientific leader and knowledge builder in the field of biomaterials. Among other achievements, our activity has resulted in the generation of knowledge (publications, patents, PhD theses) the internationalization of research through collaboration with international bodies and institutions, as well as opening our facilities to the scientific community and the industrial sector.

The Center counts with additional certifications and recognitions such as the Seal of Excellence in Human Resources [“HR Excellence in Research”](#), [UNE 166002 for RD&I Management](#), and the [AAALAC accreditation](#) for the care and use of animals in science.

In 2018 CIC biomaGUNE earned the accreditation as a “María de Maeztu Unit of Excellence”- the highest recognition of scientific excellence in Spain awarded by the Spanish State Research Agency (AEI).





AT A GLANCE

CURRENT ORGANIZATION

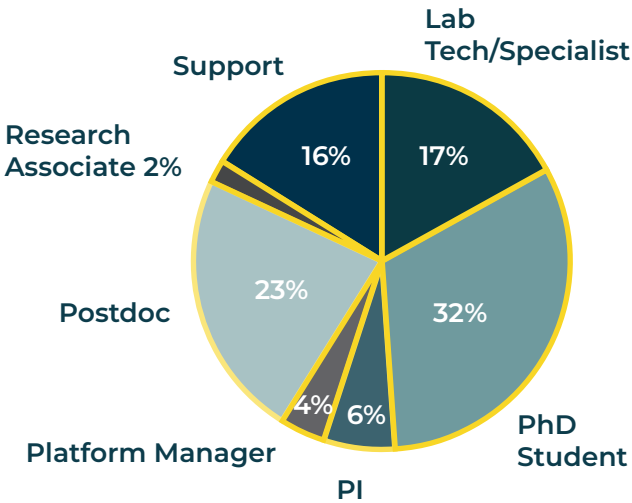
STAFF DISTRIBUTION

176

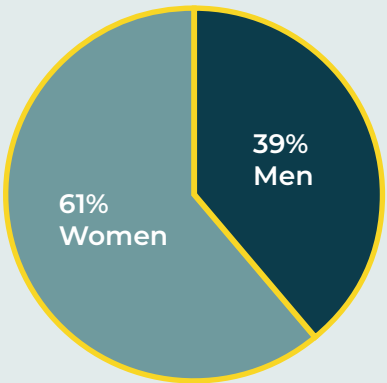
Average Staff
(61% women,
39% men)

27

Nationalities
represented
(29% of staff born
outside Spain)



GENDER DISTRIBUTION



FUNDING

AT A GLANCE

15,908,684 €

2024 Budget

25%

Base Funding

14%

Private Funding

26%

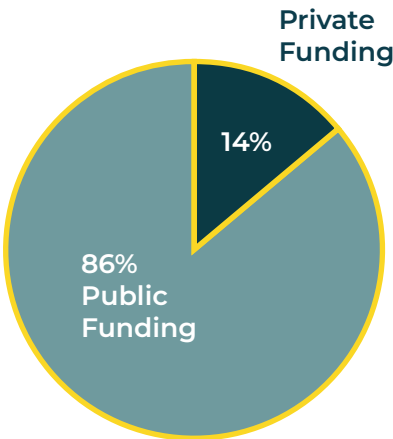
Basque
Government

14%

Spanish
Government

21%

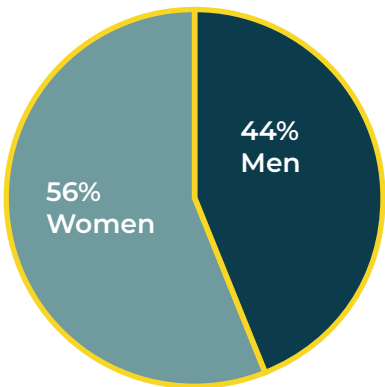
European
Commission



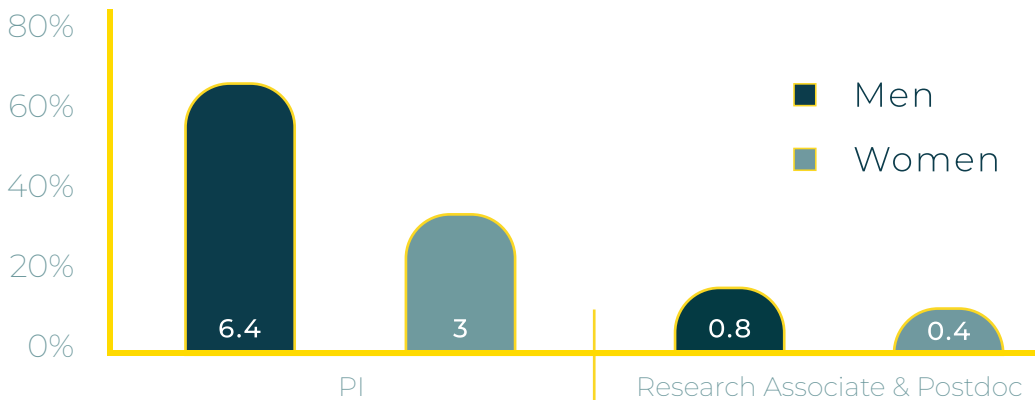
SCIENTIFIC OUTPUT

138	11,201	10.5	
Scientific Publications	Citations	Average Impact Factor	
1 st Quartile	1 st Decile	H-Index	Open Access
82%	42%	126	80%
65%	51%	51%	29%
Publications led by CIC biomaGUNE researchers	Publications involving International Collaboration	Publications involving National Collaboration	Publications involving Internal Collaboration

PUBLICATIONS 1ST AUTORSHIP



Average articles corresponding authorship per category



AWARDS & RECOGNITIONS

5	2	4	1
Awards, Academy Memberships & Honorary Degree	Best PhD/Master Theses Awards	Best Talk/Poster Awards	EMBO Fellowship

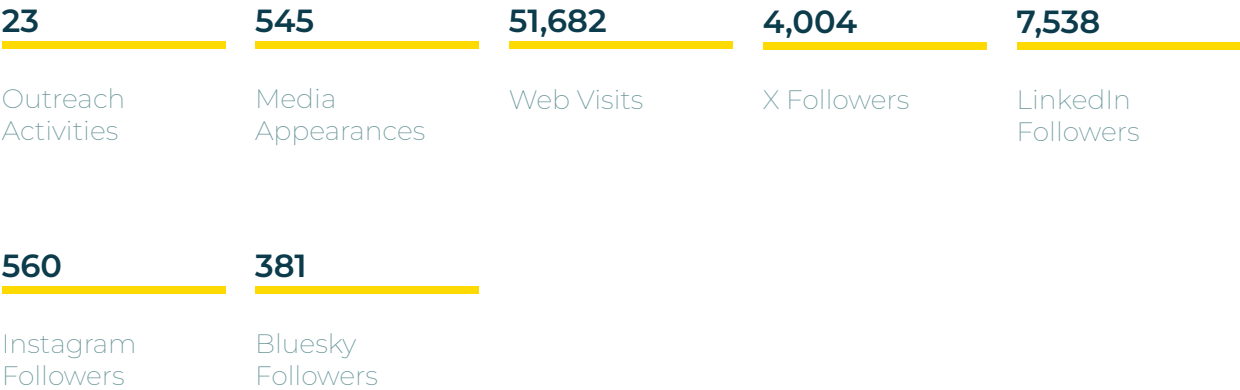
TECHNOLOGY TRANSFER

6	2	2	3	6
New Patent Families	Granted Patents and Utility Models	Trade Secrets	Licensed Patents & Other IP Rights	Technology Transfer Agreements
18	5	1		
Services & Research Contracts	Ongoing Valorisation Projects	New Spin-Off		

TRAINING & CAREER DEVELOPMENT

21	105	134	47	41
Completed PhD Theses (67% women, 33% men)	Ongoing PhD Theses (66% women, 35% men)	Incoming Research Stays (64% women, 36% men)	Outgoing Research Stays (32% women, 68% men)	Seminars (41% women speakers, 59% men speakers)
385	6	8	268	229
Internal Scientific & Technology Trainings (63% women participants, 37% men participants)	Organized Conferences	Co-organized Workshops & Conferences	CIC biomaGUNE employees attended to Workshops & Conferences (65% women, 35% men)	CIC biomaGUNE employees delivered oral & poster contributions to Workshops & Conferences (66% women, 34% men)

DISSEMINATION & PUBLIC ENGAGEMENT



SUSTAINABILITY, COMPLIANCE & SOLIDARITY

ENERGY CONSUMPTION

- **Electricity: 2,520,764 Kwh**, which represents 401,283 Kwh less than in 2021. Equivalent to 100 tCO₂eq.
- **Gas: 145.660 Kwh**, which represents 383,454 Kwh less than in 2021. Equivalent to 666 tCO₂eq.

COMMITTED TO THE SUSTAINABLE DEVELOPMENT GOALS

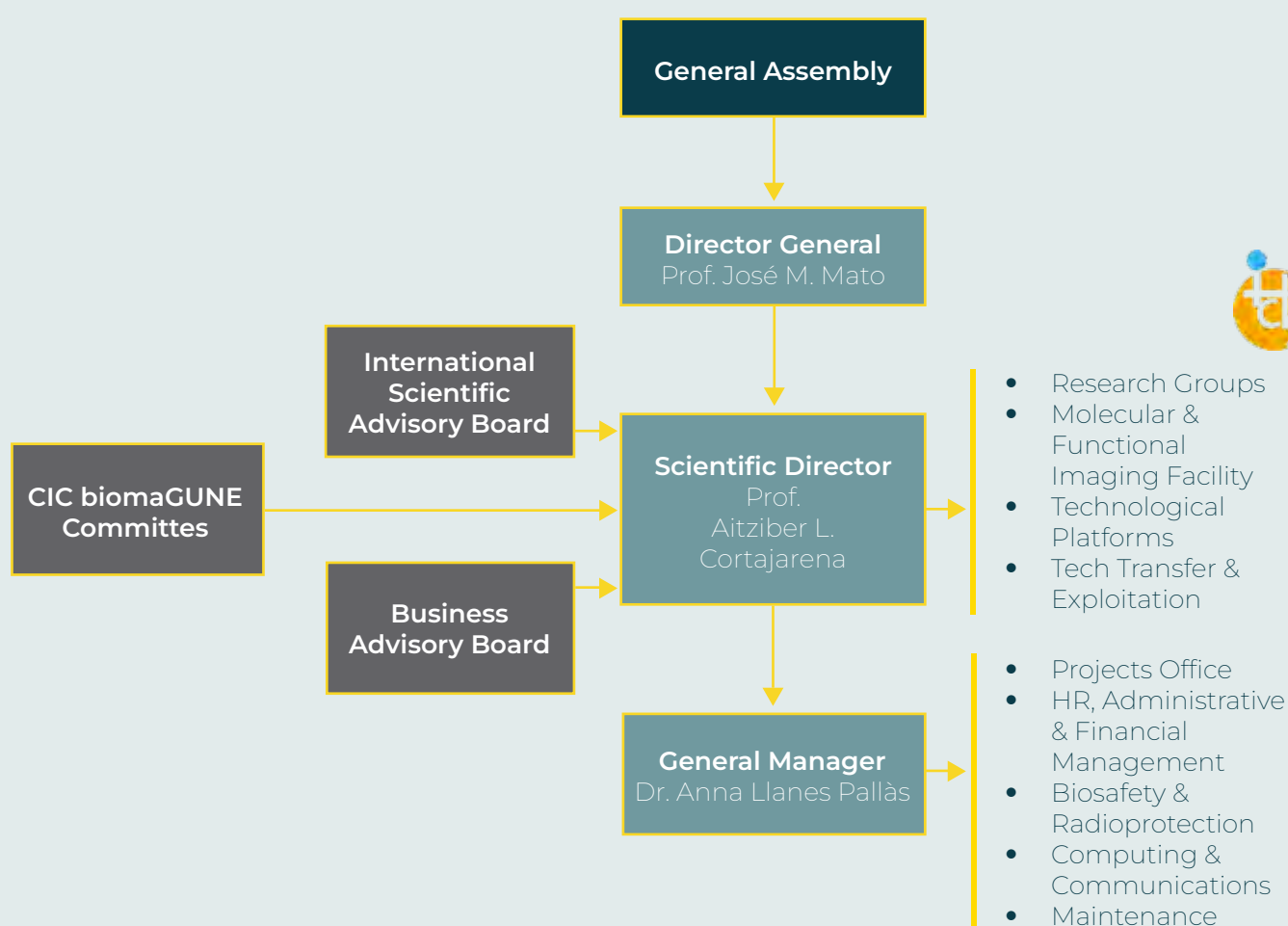
At CIC biomaGUNE, we have incorporated 10 of the 17 Sustainable Development Goals (SDGs) approved by the UN in September 2015 into our strategic programme.



ORGANIZATION

ORGANIZATION

The management structure comprises the following boards: General Assembly, International Scientific Advisory Board (ISAB), and Board of Directors.



GENERAL ASSEMBLY

The **General Assembly** meets 3 times per year to follow up the scientific and financial activities of CIC biomaGUNE. It comprises 5 public administrations and 5 companies.

PUBLIC ADMINISTRATION		COMPANIES	
 basque foundation for health innovation and research	Basque Foundation for Health Innovation and Research	BTI Biotechnology Institute	
 Diputación Foral de Gipuzkoa	Provincial Council of Gipuzkoa	Curium Pharma	
 foru aldundia diputación foral	Provincial Council of Bizkaia	Oncomatryx	
 Parke	Technology Parks Network	Industrial Química del Nalón, S.A.	
 Universidad del País Vasco	University of the Basque Country	Mondragon Corporation	

INTERNATIONAL ADVISORY BOARD (ISAB)

The **ISAB** assesses CIC biomaGUNE's scientific activity every 3 years, providing the Board of Directors with policy-level and technical advice on the strategic direction of the Center. ISAB members provide support with evaluation of internal calls and strategic decisions. The most recent meeting was held on 5–6 September 2024.



**Monica
Olvera de la Cruz**
Department of Chemistry,
Northwestern
University, USA



Samuel I. Stupp
Institute for
BioNanotechnology in
Medicine.
Northwestern University, USA



Itamar Willner
Institute of Chemistry.
The Hebrew University of
Jerusalem, Israel



Patrick Cuvreur
Université Paris-Sud,
France



Peter Seeberger
Max Planck Institute of
Colloids and Interfaces.
Germany



Michal Neeman
Weizmann Institute of
Science, Rehovot, Israel

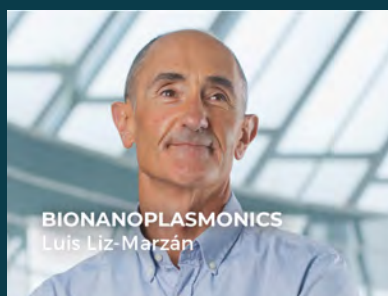


Aránzazu del Campo
INM - Leibniz Institute for
New Materials, Germany

RESEARCH GROUPS

The scientific strategy, divided in 3 main areas, is coherent and highly complementary, fostering numerous synergies among research groups toward the common aim of developing fundamental research at the frontier of the biomaterials field to find biomaterials-based solutions in health and life sciences.

While each laboratory develops its research program (as outlined below), all of them operate within a unified framework aimed at integrating newly developed materials into diagnostic and therapeutic tools. Collaborative projects leveraging complementary expertise have yielded outstanding results.





BIOMOLECULAR NANOTECHNOLOGY



Aitziber L. Cortajarena
Principal Investigator
(Ikerbasque Professor)

*Valery Pavlov – Associated
Principal Investigator
Aitor Manteca – Research
Associate (Fellow Gipuzkoa)
Itziar Galarreta – Research
Associate (Bikaintek) (Since
October 2024)*

The group is at the forefront in engineering biomolecule-based functional nanostructures and bioinspired materials for biotechnology and biomedicine (ERC CoG). Using a combination of protein and nanomaterial engineering, the group creates versatile platforms for constructing protein-based hybrid functional nanostructures and self-assembled biomaterials via bottom-up approaches, from nano- to macro-scale. By combining biomolecular engineering and bioconjugation, molecular hybrids are produced with nanoparticles, nanoclusters, or organic compounds, endowing biomolecules with novel functions. This work includes the development of functional nanostructures and biomaterials for applications in biological therapies, sensing, bioelectronics, catalysis, lighting, and data storage, among others.



GLYCOTECHNOLOGY

Niels Reichardt
Principal Investigator

Sonia Serna – Research Associate

The Glycotechnology Laboratory carries out projects in basic and applied glycoscience, focusing on carbohydrates, with untapped potential to provide innovative solutions to important social challenges, such as personalized medicine, pharmaceutical products, food, and biomaterials. The group applies carbohydrate synthesis, materials science, and molecular biology to the design of tools, probes, and devices to elucidate the role and to exploit the potential of sugars and glycomimetics for cancer immunotherapy and diagnostics, immune lectin targeting, vaccine development, and improved vector design for gene therapy.

SOFT MATTER NANOTECHNOLOGY

Sergio Moya
Principal Investigator

The Soft Matter Nanotechnology Laboratory makes use of elements of soft matter, mainly polyelectrolytes, hybrid materials for biomedical applications are developed. Recent interests include the design of carriers for gene therapy based on engineered polyamines and supramolecular interactions, for applications in cancer therapy. Carriers are also developed to facilitate transport of oxygen for photodynamic therapy of cancer. The study of the physicochemical properties of the fabricated materials and their biological fate is a key aspect of the group's research strategy, using advanced spectroscopic and imaging tools to understand how materials functionality is affected by biological environments.

BIONANOPLASMONICS



Luis M. Liz-Marzán
Principal Investigator
(Ikerbasque Professor)

Isabel García - Research Associate
(CIBER-BBN)

Malou Henriksen-Lacey –
Research Associate

The group focuses on the biomedical applications of plasmonic nanomaterials, including chemical methods for the synthesis of colloidal metal nanoparticles with tailored morphology, surface chemistry, and optical response, as well as their directed self-assembly and applications in biosensing, diagnostics and therapy, mainly based on plasmonic effects.

One of the current central topics of the group (ERC AdG) is the development of realistic three-dimensional cell/tissue models, supported by 3D-printed hydrogel scaffolds with embedded plasmonic nanoparticles, which allow the real-time detection of disease biomarkers by optical methods, including SERS. Such hybrid materials have been recently patented as platforms for the evaluation of drug efficacy in realistic *in vitro* models, toward applications in personalized medicine.



CARBON BIONANOTECHNOLOGY



Maurizio Prato
Principal Investigator
**(Ikerbasque Professor &
AXA Chair)**

Focuses on the design and synthesis of tailored carbon nanostructures (fullerenes, carbon nanotubes, graphene, and carbon nanodots) for the development of functional interfaces with enhanced performance in medicine, energy, biosensing, and diagnostics (ERC AdG). The group seeks to transfer the properties of these new materials into applications, including spinal cord repair, innovative immunotherapies, selective biosensors, MRI contrast agents, water splitting, and reduction of carbon dioxide into useful chemicals.



HETEROGENEOUS BIOCATALYSIS



Fernando López Gallego
Principal Investigator
(Ikerbasque Professor)

The Laboratory of Heterogeneous Biocatalysis applies multi-enzyme systems to synthetic, environmental, medical, and analytical chemistries, by harnessing the exquisite selectivity of enzymes, to develop sustainable and efficient chemical processes. The group aims to open new paths toward cell-free synthetic biology and *in vitro* metabolic engineering (ERC CoG). The main inspiration driving this research is the spatial organization found in living organisms, which are mimicked to fabricate *ex vivo* systems supported on solid materials. To address this goal, the group interfaces chemistry and biology utilizing multidisciplinary tools that involve molecular biology, enzymology, and materials chemistry.



BOTTOM-UP CELL BIOLOGY AND BIOENGINEERING (Since May 2024)

Natalia Baranova
Junior Group Leader
**(Ikerbasque and Ramón y Cajal
Fellow)**

The Bottom-up cell Biology and Bioengineering Lab aims to reverse engineer molecular assemblies to understand how they function and search for clinically relevant strategies to control peptidoglycan synthesis, biofilm matrix remodelling and host-pathogen interactions. Our general goal is to advance our mechanistic understanding of the key process in bacterial physiology, potentially exposing new bacterial targets and consequently aiding the development of new strategies to fight bacterial pathogens.

REGENERATIVE MEDICINE & DISEASE MODELS

Ander Abarrategi
Junior Group Leader
(Ikerbasque and Ramón y Cajal Fellow) – Until November 2024

The Regenerative Medicine Laboratory uses biomaterial-based approaches to boost knowledge in stem-cell biology, both in physiological and pathological contexts. For this aim, we generate bioactive and cell-laden 3D structures potentially useful for regenerative medicine and disease modelling studies. The understanding of bone tissue is the core of our research. Briefly, we design, characterize and test different kinds of implantable devices to gain insight into specific tissue formation processes. From this information we define and modulate relevant mechanisms in the context of tissue regeneration and tissue pathology.

HYBRID BIOFUNCTIONAL MATERIALS

Dorleta Jimenez de Aberasturi
Junior Group Leader
(Ikerbasque and Ramón y Cajal Fellow)

The group focuses on the design of hybrid biomaterials responsive to specific stimuli, to gain a better understanding of cell-material interactions, propose advances in tissue engineering techniques, and seek solutions in the field of translational medicine. One of the current central topics of the group is the development of hybrid functional bioinks for the fabrication of *in vitro* 3D printed models that can be used as ideal platforms to better understand the causes behind different diseases and to perform drug screening studies.

MOLECULAR & FUNCTIONAL BIOMARKERS

Jesús Ruiz-Cabello
Principal Investigator
(Ikerbasque Professor)
Susana Carregal - Research Associate (Ikerbasque and Ramon y Cajal Fellow)
Ermal Ismalaj - Research Associate (Fellow Gipuzkoa)

The group focuses on cardio-pulmonary and vascular diseases, such as atherosclerosis and pulmonary hypertension, using functional and molecular imaging and systems biology approaches. Particular interest is put into nanotechnology-based applications for early diagnosis and monitoring new therapeutic approaches in vascular diseases. We investigate metabolic changes associated with vascular cell growth and proliferation, the structure and function of the right ventricle, and cardiovascular coupling signals. Current activity focuses on developing new biomarkers for flow imaging and participating in a clinical trial with pulmonary hypertension patients.



RADIOCHEMISTRY & NUCLEAR IMAGING

Jordi Llop

Principal Investigator

The group focuses on the development of innovative radiochemistry and application of positron emission tomography (PET) and single photon emission computed tomography (SPECT) tracers, toward understanding biological, physiological, and pathological processes in oncology, neurology, pneumology, infection and cardiovascular diseases. Specifically: (i) innovative radiochemical strategies to obtain positron emitter-labeled tracers, covering various molecular modalities (small molecules, peptides, proteins, antibodies/antibody fragments and nanoparticles) and radionuclides (^{11}C , ^{13}N , ^{18}F , ^{64}Cu , ^{89}Zr , ^{124}I); (ii) investigate the mechanism underlying high-incidence diseases, by combined imaging modalities; (iii) develop and evaluate new theranostic agents.



MAGNETIC RESONANCE IMAGING

Pedro Ramos

***Principal Investigator
(Ikerbasque Professor)***

The Magnetic Resonance Imaging (MRI) Laboratory works on the development of MRI-based methods for the definition of early imaging biomarkers of disease, aiming at advanced diagnosis and treatment of vascular and neurodegenerative disorders of the central nervous system. Using animal models, longitudinal imaging approaches and image analytics, genetically induced or disease-related changes on the phenotype, metabolism, function and connectivity of the brain are studied. Focus is also given to the design of theranostic nanomaterials that reach disease targets across the Blood Brain Barrier for effective treatment of neurological diseases.

RESEARCH FACILITIES

The Center counts with a unique research infrastructure of almost 5,000 m², equipped with advanced nanoscience, (bio)chemistry, bioprinting, and cell biology, including Technological Platforms, and the Molecular and Functional Imaging Facility, part of the Singular Scientific and Technical Infrastructure “Distributed Biomedical Imaging Network” (REDIB), and one of the most complete preclinical imaging infrastructures in Europe.

Each platform is managed by highly trained personnel who not only maintain the facilities and provide training, but also actively participate in the research when advanced operation and data analysis are required.

CIC biomaGUNE covers salaries of specialized Platform Managers and technicians, maintenance and purchase of new equipment. In this regard, in 2024 we received support from the Basque Government to purchase a new multimodal imaging system for preclinical use, as well as support from the Provincial Council of Gipuzkoa to acquire a new RAMAN microscope with confocal adjustment for the analysis of biological samples.



MOLECULAR & FUNCTIONAL IMAGING FACILITY

Designed, built and equipped to tackle longitudinal and multimodal pre-clinical projects and to develop applications in the areas of Preclinical Molecular and Functional Imaging and Nanomedicine.

The research-oriented preclinical imaging facility offers state-of-the-art imaging resources in: (i) radiochemistry (dual particle-high current cyclotron capable to routinely produce ^{18}F , ^{11}C , and ^{13}N ; versatile synthesis boxes housed in shielded hot cells; and state-of-the-art analytical equipment including radio-HPLC, radio-GC, radio-TLC, and gamma spectrometry); and (ii) small-animal imaging including modular trimodal system comprising two PET scanners, one SPECT, and a CT, optical imaging and high field Magnetic Resonance Imaging (MRI, 7.0 and 11.7 T). The MRI unit and the Nuclear Imaging unit are located on either side of a dedicated animal housing area, which holds since 2015 accreditation by the Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC) and is prepared to house up to 960 mice and 234 rats in individually ventilated cages, with an experimental area specifically devoted to performing longitudinal studies. The animal house is complemented with microsurgery areas for animal preparation. Four workstations and a data storage system in the Terabyte scale enable image reconstruction, processing, quantification and archiving.

Personnel with extensive scientific background and experience in handling and operating specific equipment, technologies, methodologies or experimental animals complete the scientific-technical staff.

The Facility is currently integrated in the “Distributed Biomedical Imaging Network” (ReDIB, www.redib.net), recognized by the Spanish Government as a Singular Scientific and Technical Infrastructure (ICTS).

Molecular and Functional Imaging Unit
at CIC biomaGUNE



RADIOCHEMISTRY PLATFORM

Vanessa Gómez-Vallejo
Platform Manager

The platform is equipped with an IBA Cyclone 18/9 cyclotron able to accelerate protons (18 MeV) and deuterons (9 MeV) and is equipped with 7 targets for the routine production of [^{18}F]-F, [^{18}F]-F₂, [^{13}N]-NH₄⁺, [^{15}O]-O₂, [^{11}C]-CO₂ and [^{11}C]-CH₄. It also has a solid target to produce ^{89}Zr and ^{64}Cu .

The radiochemistry laboratory equipped with 5 shielded hot cells housing versatile automatic synthesis, suitable for the production (synthesis and purification) of PET and SPECT radiotracers. The facility has specially designed modules for:

- Synthesis of [^{11}C] CH₃I / [^{11}C] CH₃OTf from [^{11}C] CO₂ / [^{11}C] CH₄, and subsequent methylation reaction
- ^{18}F -fluorination by nucleophilic substitution
- Purification of ^{64}Cu and ^{89}Zr

The platform also consists of two cells to perform semi-automated syntheses of ^{68}Ga , ^{177}Lu , ^{111}In , ^{131}I , and other long half-life radioisotopes. Additionally, there is also a hot cell dedicated to alpha particles (e.g., ^{225}Ac).

The quality control lab, sited in the same location as the production lab, is equipped with state-of-the-art equipment to perform the complete quality control of the synthesized radiotracers, including radio-HPLC, radio-GC, radio-TLC, and gamma spectrometry.





NUCLEAR IMAGING & IMAGE ANALYTICS

Unai Cossío
Platform Manager

The Nuclear Imaging platform provides cutting-edge imaging capabilities for Positron Emission Tomography (PET), Single Photon Emission Computerized Tomography (SPECT), Optical Imaging (OI), and Computerized Tomography (CT). It includes a multimodal PET/SPECT/CT/OI system and a modular trimodal system comprising two PET scanners, one SPECT, and a CT. These systems enable *in vivo* multimodal studies on the same subject, facilitating non-invasive, comprehensive research approaches that capture both functional and anatomical data.

The platform also features three dedicated workstations with multiple licenses for PMOD and Imalytics software, supported by high-capacity data storage systems that enable real-time image reconstruction, advanced data processing, quantitative analysis, and secure archiving. Additionally, for high-resolution nuclear imaging at the end point, the platform is equipped with an autoradiography system.



MAGNETIC RESONANCE IMAGING (MRI)

Daniel Padró
Platform Manager

Equipped with instrumentation to conduct advanced imaging and spectroscopic experiments applied to biological samples including small rodents, samples or tissue extracts and cell cultures is available. CIC biomaGUNE provides the instrumentation and the expertise to carry out a wide range of MRI and MRS experiments and is equipped with surgery rooms for animal preparation and implementation of surgical models. Ancillary equipment is also available: anesthesia systems, MRI-compatible physiological monitoring systems, infusion pumps, and temperature regulation systems. Equipment available: MRI 7T/30 cm (70/30 USR), MRI 11.7T/16 cm (117/16 USR).



ANIMAL FACILITY

Ainhua Cano
Platform Manager

A dedicated animal housing area is situated between the MRI unit and the Nuclear Imaging unit. The animal facility holds accreditation of the **Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC)** since 2015 and is prepared to house up to 960 mice and 234 rats in individually ventilated cages, with an experimental area specifically devoted to performing longitudinal studies. The animal house is complemented with microsurgery areas for animal preparation.

TECHNOLOGICAL PLATFORMS

Managed by specialized Platform Managers, the technological platforms provide technical and scientific support to the research activities conducted at CIC biomaGUNE. They include the following state-of-the-art research infrastructures:

NUCLEAR MAGNETIC RESONANCE (NMR)

Daniel Padró
Platform Manager

Equipped with a **500 MHz NMR** spectrometer, it provides essential service for the characterization of molecules with biological activity, from complex glycans to molecules used in the design of nanostructures for biomedical applications.

ELECTRON MICROSCOPY

Marco Möller
Platform Manager

Equipped with **SEM-EDX, TEM – 120 keV and 200 keV**, it offers techniques to study nanoparticles and biological or soft polymer materials (cryo-TEM) at the micrometer and nanometer scale to determine the materials dimensions, shape and composition.

MASS SPECTROMETRY

Javier Calvo
Platform Manager

The platform is equipped with state-of-the-art mass spectrometers of different ionization sources such as **electrospray, ICP**, and **MALDI**. These instruments, equipped with high-resolution analyzers (**QTOF & TOF**), allow for structural analysis and characterization ranging from small organic molecules to complex biomolecules and nanomaterials, as well as elemental absolute quantification by **ICP/MS**. Additionally, high-resolution liquid and gas chromatography systems (**UHPLC** and **GC/MS**) are available in order to improve the analysis of complex samples.

Furthermore, the platform is equipped with advanced technologies for molecular imaging, including MALDI imaging and DESI, allowing spatially-resolved molecular and chemical profiling directly from sample surfaces.



SURFACE ANALYSIS AND FABRICATION

Desiré Di Silvio
Platform Manager

Equipped with *XPS*, *3 x AFM*, *sputtering system*, it focuses on the analysis of materials at the surface level, including spectroscopic and microscopic techniques especially suited to surfaces. The platform also offers service for the deposition of thin layers with controlled manufacture at the nanoscale.

OPTICAL SPECTROSCOPY & IMAGING

Irantzu Llarena
Platform Manager

Judith Langer
Platform Manager



Equipped with *2 x Fluorescence Confocal* microscopes (1 of them equipped with *multiphoton laser*), Epifluorescence microscope for live cell imaging, *2 x Confocal-Raman* microscopes, Dark field microscope, *UV-VIS-NIR*, *FT-IR* and *Raman* spectrometers, *UV-NIR Fluorimeter*, *Flow Cytometer*, Spectropolarimeter (*CD*), Dynamic Light Scattering (*DLS*), Differential Scanning Calorimeter (*DSC*), Monolith MST this platform offers a wide variety of techniques for the spectroscopic characterization of biomaterials and biosurfaces. Also included are optical microscopy techniques (confocal fluorescence, Raman, etc.), to investigate biofunctional materials and the interaction of nanomaterials with cellular systems of diverse complexity.

DIRECTORATE & MANAGEMENT

EXECUTIVE DIRECTION & MANAGEMENT

Composed by the Director General, the Scientific Director, and the General Manager.

José M. Mato

Director General

Aitziber L. Cortajarena

Scientific Director

Anna Llanes Pallàs

General Manager

Their roles are key to the Center and must ensure excellence in research and management at all levels. They are in charge of defining the structure of CIC biomaGUNE, coordinating the scientific strategy, supervising the organizational units, managing the available space and human resources, and prioritizing infrastructure acquisition and renewal and ensuring adequate use of available economic resources.

HR & ADMINISTRATION

Sheyla García Medel

HR & Administration Manager

Elizabeth Noguera Olaechea

Finance & Control Manager

This department is responsible for the management of finances, accounting, administration, and the human resources of the Center.

PROJECTS OFFICE

Cristina Díez García

Project Manager

A dedicated office to support and strengthen the capacities of the Center, in terms of attracting funding from various Research Programs, in particular, international ones, strengthening links between academic and industrial environments, and promoting the transfer of research results to society and industry, especially to the biotechnology sector.

TECHNOLOGY TRANSFER & INNOVATION

Marcos Simón Soria

Technology Transfer Manager

The technology transfer office manages the intellectual property facilitating the flow of knowledge from the Center to society and driving business development. It is dedicated to identifying and safeguarding intellectual property, negotiating licensing agreements, and catalyzing the commercialization of research outcomes.



BIOSAFETY & RADIOPROTECTION

Paola Ferreira Cabeza
Biosafety & Radioprotection
Manager

This department is dedicated to establishing safe working conditions for all CIC biomaGUNE's personnel by promoting good laboratory practices. The service is also in charge of the appropriate operation of the Center's Radioactive Facility.



COMPUTING & COMMUNICATIONS

Mikel Gonzalez Lacunza
IT Manager

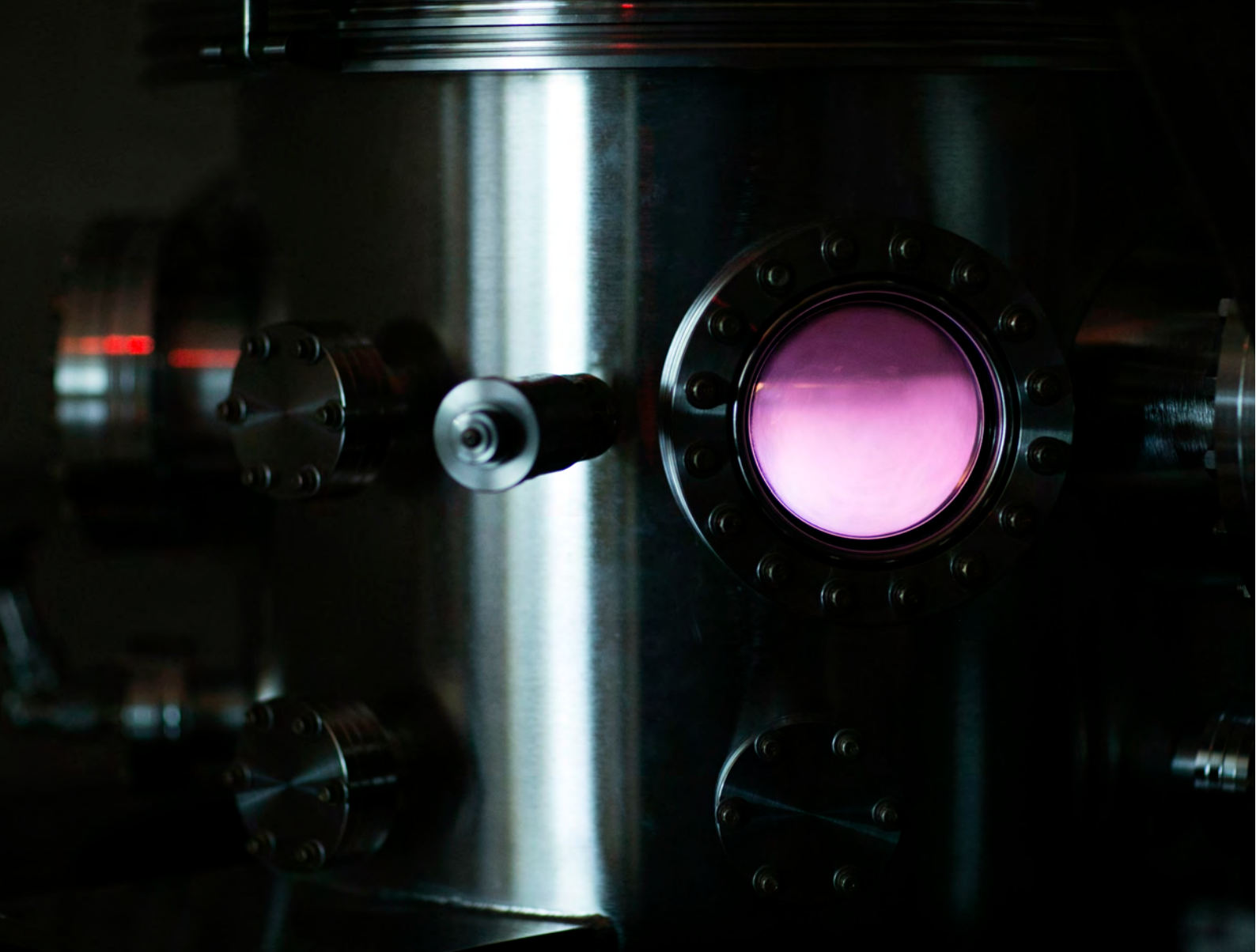
The IT department is responsible for setting up and maintaining computer-related equipment, software, data storage, email servers and the Center's website.



MAINTENANCE

Álvaro Ruiz Fernández
Maintenance Manager

This department takes care of the preventive, predictive and corrective maintenance of all facilities at CIC biomaGUNE.



ATTRACTION & TRAINING **OF SCIENTIFIC TALENT**

TALENT ATTRACTION

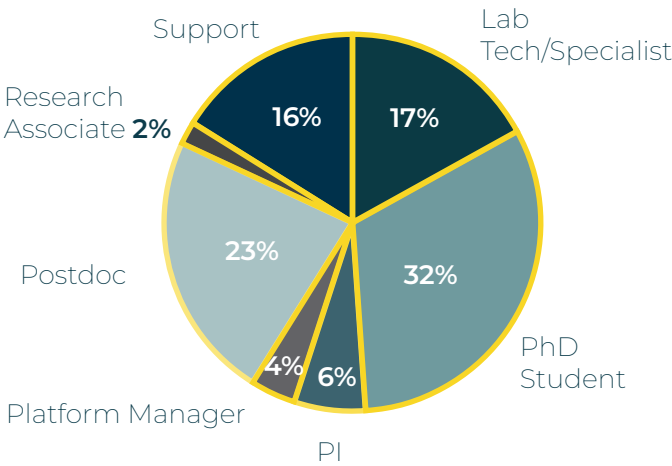
CIC biomaGUNE has an average workforce of 176 people, with a balanced gender distribution — 61% of our staff being women — as well as an international profile with over 29% of the staff coming from abroad. We maintained a balanced gender distribution among PhDs, Postdocs, and Research Fellows, as well in management positions, including the General Manager and the Scientific Director.

Our strategic scientific project has been reinforced through the recruitment of **Natalia Baranova in May 2024, leading the Bottom-Up Cell Biology and Bioengineering Laboratory.**

In terms of training, we had a yearly average of 47 postdoctoral researchers and 65 predoctoral researchers, with 21 successfully completed theses.

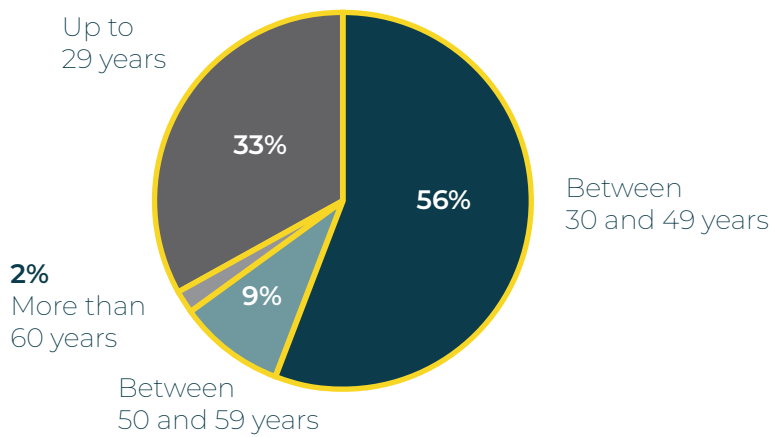
PERSONNEL OVERVIEW

The table below provides the distribution of CIC biomaGUNE's personnel during 2024 in Full Time-Equivalent (FTE):

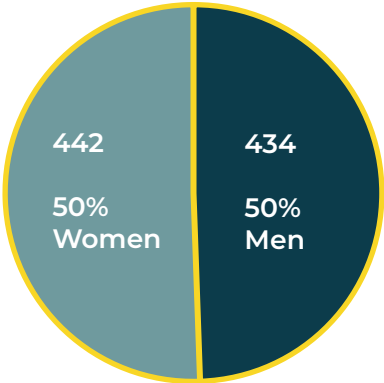


Position	Women	%	Men	%	Total	%
Principal Investigator	3	23%	9	77%	11	6%
Research Associate	3	60%	2	40%	5	3%
Platform Manager	5	56%	4	44%	9	5%
Lab Technician/ Platform Specialist	24	79%	7	21%	20	17%
Postdoctoral Researcher	23	59%	16	41%	40	22%
PhD Student	33	64%	19	36%	52	30%
Direction and Administration	11	79%	4	24%	15	8%
Biosafety and Radioprotection	2	100%	0	0%	2	1%
IT and Maintenance	1	12%	7	88%	8	5%
Master & Summer Students	3	88%	0	12%	3	2%
	108		68		176	

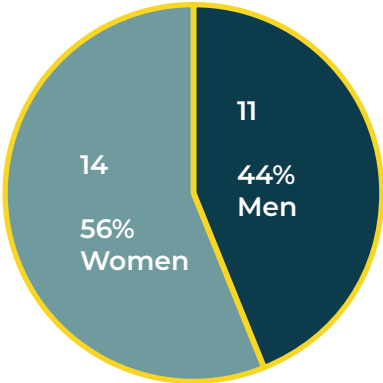
AGE DISTRIBUTION



APPLICANTS TO SELECTION PROCESS



SELECTED/HIRED CANDIDATES



INTERNATIONAL REPRESENTATION

CIC biomaGUNE is **a multicultural organization** with people from 30 different countries and **29%** of the research staff born outside Spain.



 EQUALITY

CIC biomaGUNE has been committed to **equality** since its inception and has formally reinforced this commitment in 2020. Our approach goes beyond legal compliance. It is an opportunity to cultivate a culture built on shared values, transparency, and continuous improvement. This commitment is embedded in our **RD&I Policy** and other institutional directives developed over the years.

The **Equality Committee**, established in 2018, collaborates with the **Direction** to implement **CIC biomaGUNE's Equality Plan**. This plan ensures **equal opportunities, fair recruitment policies, and work-life balance** while also driving outreach activities that encourage young girls to pursue STEM careers and promote the visibility of women in science.

Since 2020, CIC biomaGUNE has introduced **measures to enhance workplace flexibility**, significantly improving work-life balance. As a result, requests for **childcare leave** and **reductions in working hours for legal guardianship** have decreased, mitigating income loss for employees.

Our ongoing commitment to equality is reflected in several key initiatives:

 **2021**

Approval of the **Protocol for the Prevention and Action Against Workplace, Sexual, and Gender-Based Harassment**.

 **2022**

Development of an **Inclusive Language Guide** to foster gender-sensitive communication.

 **2023**

Establishment of a **lactation room**, supporting breastfeeding mothers and helping them overcome workplace challenges that might otherwise lead to early discontinuation of breastfeeding.

 **2023**

Active participation in the **International Congress on Equality, Science, and Technology: For a Paradigm Shift**, promoted by **Emakunde - The Basque Institute for Women** (<https://www.cicbiomagune.es/new>).

 **2024**

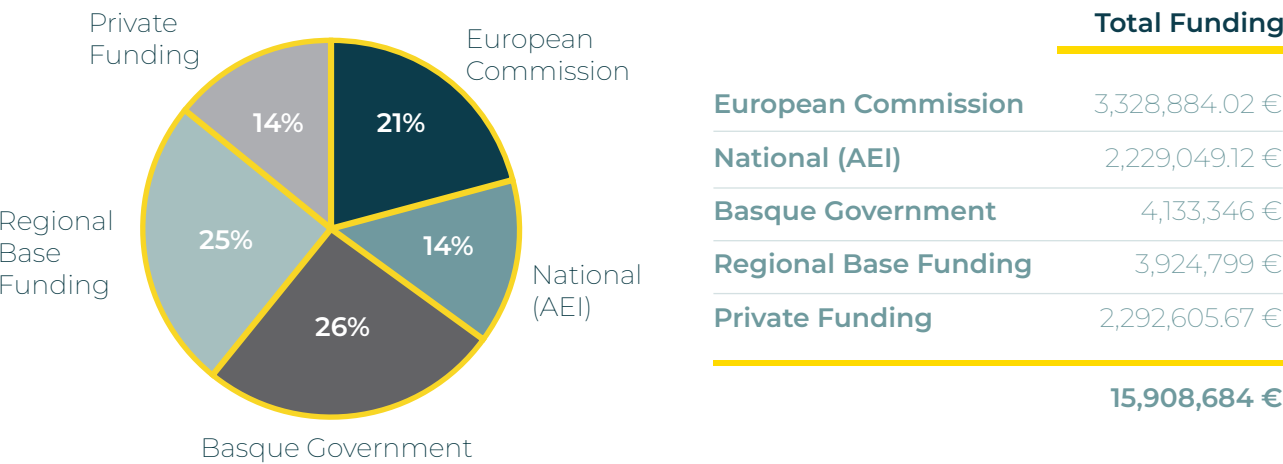
Approval of the **2nd Equality and Diversity Plan**, reinforcing our long-term commitment to an inclusive and diverse work environment (<https://www.cicbiomagune.es/equality>).



FUNDING **MODEL**

2024 BUDGET

The **total budget** for 2024 has amounted 15,908,684 €, 85.6% of which came from public sources and 14.4% from private sources.



LAUNCHED PROJECTS

50 new projects (from competitive funding sources) have been launched in 2024 with a total contribution of 8,453,195 €.

From the new launched projects, we highlight 1 ERC-PoC, 5 MSCA actions and 2 EIC Pathfinder projects funded under Horizon Europe.

	Total Projects	Total Granted
Basque Government	20	3,032,658.73 €
European Commission - Horizon Europe	7	2,119,495.32 €
European Research Council (ERC) - Horizon Europe	1	150,000.00 €
Spanish Research Agency - AEI	14	2,700,369.52 €
Gipuzkoa Provincial Council	5	405,000.00 €
Fomento San Sebastián	1	12,000.00 €
EMBO	1	9,350.00 €
Fundación Eugenio Rodríguez Pascual	1	24,321.40 €
Total	50	8,453,194.97 €

LIST OF FUNDED PROJECTS STARTING IN 2024



PI	Call	Amount (€)	Period	Full Title (Acronym)
Luis Liz-Marzán	ERC-2023-PoC2 Proof of Concept Grant	150,000.00	2024-2025	Translation of biomimetic 3D-printed tumour models into their application as a screening tool in cancer therapy (3DTUMOUR)



PI	Call	Amount (€)	Period	Full Title
Luis Liz-Marzán	HORIZON-MSCA-PF-2022-01 MSCA Postdoctoral Fellowships 2022	181,152.96	2024-2026	In situ growth of thermoplasmonic nanoparticles in microfluidic platforms for modifying stem cell fate (PLASMOSTEMFATE)
Maurizio Prato	HORIZON-MSCA-PF-2022-01 MSCA Postdoctoral Fellowships 2022	181,152.96	2024-2025	Probing the visible- light-driven photocatalytic mechanism to improve the photocatalytic performance of carbon nanodots (CNDs) (PRISM)
Maurizio Prato	HORIZON-TMA-MSCA-DN 2022 Doctoral Networks	251,971.20	2024-2028	ElectroChemiLuminescence doctoral network for early sepsis diagnosis (EClectic)
Sergio Moya	HORIZON-TMA-MSCA-DN 2022 Doctoral Networks	251,971.20	2024-2028	A training network for the design of synthetic carbohydrate-based vaccines in the fight against multi-drug resistant (or antibiotic resistant) nosocomial pathogen Acinetobacter baumannii (ACINETWORK)
Luis Liz-Marzán, Aitziber López Cortajarena, Maurizio Prato	HORIZON-MSCA-SE-2022-01 MSCA-SE Staff Exchanges	289,800.00	2024-2027	Designing of multifunctional nanomaterials for light-driven innovation technologies (DELIGHT)
Jordi Llop	EIC Pathfinder OPEN 2023	539,562.00	2024-2027	SUPRAMOLECULAR AGENTS AS RADIOTHERANOSTIC DRUGS (SMARTdrugs)
Maurizio Prato	EIC Pathfinder OPEN 2023	423,885.00	2024-2027	FLOW detection of virUses by graphene Field Effect Transistor microarrays (FLUFET)
Luis Liz-Marzán	HORIZON-MSCA-PF-2022-01 MSCA Postdoctoral Fellowships 2022	181,152.96	2024-2026	In situ growth of thermoplasmonic nanoparticles in microfluidic platforms for modifying stem cell fate (PLASMOSTEMFATE)



PI	Call	Amount (€)	Period	Full Title
Dorleta Jimenez de Aberasturi	Ayudas para contratos Ramón y Cajal (RYC 2022)	244,350.00	2024-2030	Hybrid functional materials for biofabrication (RYC2022)
Natalia Baranova	Ayudas para contratos Ramón y Cajal (RYC 2022)	314,350.00	2024-2029	
Jesus Ruiz-Cabello	Ayudas para contratos predoctorales para la formación de doctores 2022	111,758.00	2024-2028	Nuevas Aproximaciones Teranosticas En Hipertension Pulmonar: Intervenciones En El Estilo De Vida
Luis Liz-Marzán, Maurizio Prato	Ayudas para contratos predoctorales para la formación de doctores 2022	111,758.00	2024-2028	Biofunctional Nanomaterials (Efecto de quiralidad en multiescala sobre la diferenciación celular)
Niels Reichardt	Ayudas para contratos predoctorales para la formación de doctores 2022	111,758.00	2024-2027	Development of sialoglycomimetics by combinatorial synthesis and their evaluation as potential Siglec inhibitors
Susana Carregal Romero	Consolidación investigadora (CNS 2023)	199,999.52	2024-2026	Advanced inorganic nanocatalysts for biomedical applications (CAT-BIOMED)
Aitziber López Cortajarena	Proyectos de Generación de Conocimiento (PID 2022)	111,758.00	2024-2028	Protein based tools and functional biomaterials for biomedical applications (PROTHER-FPI)
Maurizio Prato	Proyectos de Generación de Conocimiento (PID 2022)	111,758.00	2024-2028	Desarrollo de hidrogeles con alto contenido de nanotubos de carbono para regeneración neuronal (NEUROGEL-FPI)
Natalia Baranova	Proyectos de Generación de Conocimiento (PID 2023)	142,000.00	2024-2027	Bottom-up peptidoglycan synthesis: from mechanistic understanding towards identification of novel inhibitors (TheWall)
Jordi Llop	Proyectos de Generación de Conocimiento (PID 2023)	280,080.00	2024-2028	Myelin dysfunction in the pathogenesis of Alzheimer's Disease: Evaluation of novel therapeutic strategies using Molecular Imaging (MYAMI)

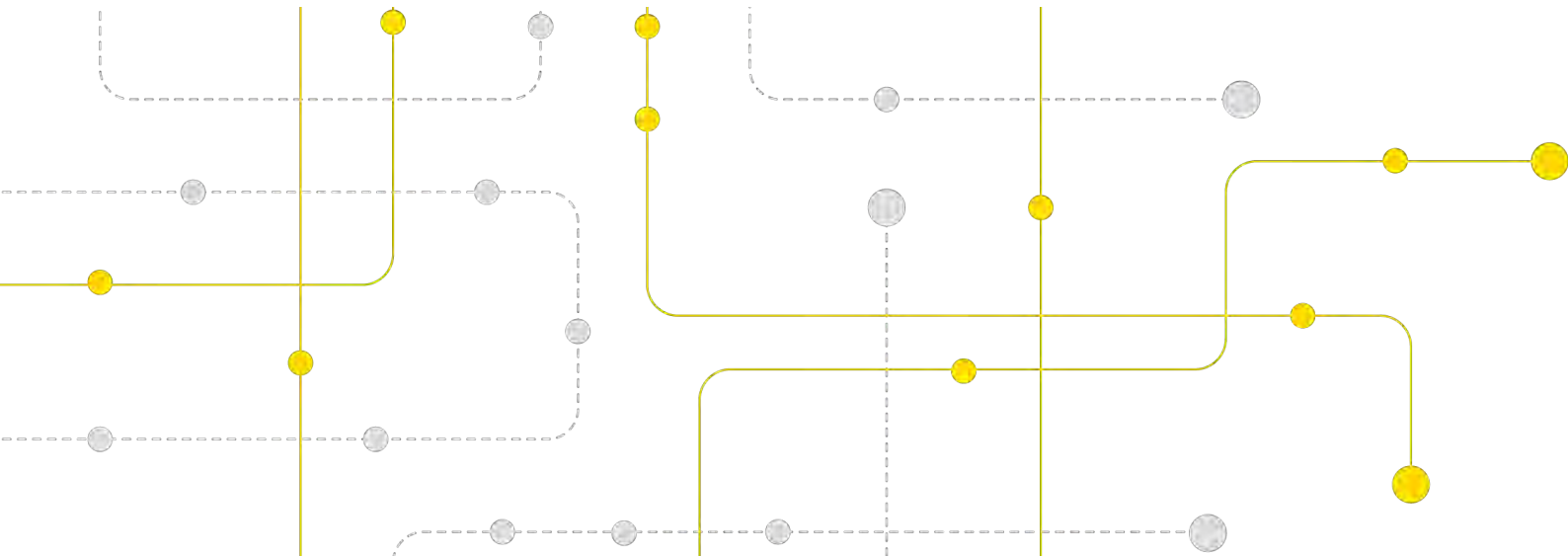
PI	Call	Amount (€)	Period	Full Title
Luis Liz-Marzán, Malou Henriksen	Proyectos de Generación de Conocimiento (PID 2023)	370,000.00	2024-2027	3D printed plasmonic BIOsensing cellular SCAFFolds for precision ONCology (BIOSCAFFONC)
Pedro Ramos Cabrer	Proyectos de Generación de Conocimiento (PID 2023)	181,300.00	2024-2027	Non-invasive imaging of the anatomical-metabolic-functional axis for the study of the age-related myelin breakdown (MYE-image)
Niels Reichardt	Proyectos de Generación de Conocimiento (PID 2023)	262,500.00	2024-2027	Terapias Avanzadas Basadas en Glicanos (GLYCOMED)
Anna Llanes Pallàs	Preparación y Gestión de proyectos europeos y facilitar la Atracción de Talento Internacional 2023 (PGE)	147,000.00	2024-2025	Impulso de la Unidad de Recursos Humanos de CIC biomaGUNE hacia la atracción de talento internacional (BiomaTalent)



PI	Call	Amount (€)	Period	Full Title
Fernando López Gallego	Elkartek 2023 - Fase II	724,211.14	2024-2025	Desarrollo de materiales biocatalíticos para su aplicación en bioeconomía y biomedicina (bmG23-2)
Jesus Ruiz-Cabello, Dorleta Jimenez de Aberasturi	Elkartek 2024	897,117.31	2024-2025	Biomarcadores y métodos alternativos de diagnosis y seguimiento terapéutico de hipertensión pulmonar asociada a fibrosis (bmG24-1)
Aitziber López Cortajarena	Elkartek 2024	20,116.47	2024-2025	Investigación y perfeccionamiento de técnicas de fabricación y materiales para la obtención de dispositivos MICrofluídicos con características altamente hidróFILas (FLUIMED-1)
Fernando López Gallego	PREDOC	24,633.17	2024-2024	Fabrication of heterogeneous biocatalysts for the reduction and amination of beta-ketoesters

PI	Call	Amount (€)	Period	Full Title
Aitziber López Cortajarena	PREDOC	23,224.17	2024-2024	Development of RNA-editing tools through engineering of biomolecule-nanomaterial hybrids for therapeutic approaches
Dorleta Jimenez de Aberasturi, Malou Henriksen	PREDOC	24,633.17	2024-2024	Smart hybrid inorganic-organic multifunctional bioinks and their application in 3D printing of disease models
Dorleta Jimenez de Aberasturi, Malou Henriksen	PREDOC	24,958.00	2024-2025	Smart hybrid inorganic-organic multifunctional bioinks and their application in 3D printing of disease models
Aitziber López Cortajarena	IKERBILERAK 2024-1 - Ayudas para la organizacion de congresos	20,000.00	2024-2024	EUROPEAN SOUTH ATLANTIC BIOPHYSICS CONGRESS (Congreso Internacional Biofísica Franco-Luso-Español SEB 2024) (ESAB2024)
Fernando López Gallego	IKERBILERAK 2024-2 - Ayudas para la organizacion de congresos	5,455.00	2024-2024	IV Jornadas de Biocatálisis (IV JEBS)
Anna Llanes Pallàs	Contratación de una consultora homologada para la realización de un Diagnóstico sobre la igualdad de mujeres y hombres y un Plan para la igualdad (2024)	12,000.00	2024-2024	Plan de Igualdad CIC biomaGUNE 2024-2027
Fernando López Gallego	BIKAINTEK 2024 - Ayudas para la contratación de personas investigadoras doctoradas	55,229.52	2024-2026	Fabricación de Biocatalizadores Heterogéneos Autosuficientes para Química Fina y Medicina (FABIOHETA)
Aitziber López Cortajarena	BIKAINTEK 2024 - Ayudas para la contratación de personas investigadoras doctoradas	55,229.52	2024-2026	Microfluidic methods for epitope selection (MiMEpi)
Jesus Ruiz-Cabello	Ayudas al diseño de Proyectos Tractores Transversales Colaborativos de Investigación	25,000.00	2024-2025	Prevención de accidentes cardio y cerebro vasculares para envejecimiento saludable (PRECERVAS)

PI	Call	Amount (€)	Period	Full Title
Jesus Ruiz-Cabello	Ayudas a proyectos de investigación y desarrollo en salud (RIS3) 2024	47,462.54	2024-2024	Enfoque teranóstico integral para la fibrosis basado en nanobiotecnología (FIBROTERA (3))
Aitziber López Cortajarena	Ayudas a proyectos de investigación y desarrollo en salud (RIS3) 2024	19,094.01	2024-2024	Nueva estrategia terapéutica en glioblastoma a través del silenciamiento de la vía de TGF-? (Glioblastoma (3))
Niels Reichardt	Ayudas a proyectos de investigación y desarrollo en salud (RIS3) 2024	17,015.72	2024-2024	Enfoque multiómico y espectroscópico integrado para la identificación de nuevos biomarcadores CAR-T en sangre mediante análisis de aprendizaje automático (BIOCART(2))
Sergio Moya	Ayudas a proyectos de investigación y desarrollo en salud (RIS3) 2024	30,876.26	2024-2024	Aplicación de nano-compuestos como sistema de entrega no viral para el desarrollo de terapias CAR-T
Jesus Ruiz-Cabello	Ayudas a proyectos de investigación y desarrollo en salud (RIS3) 2024	0.00	2024-2024	Conexión entre orgánulos: su papel en enfermedades neurológicas y el desarrollo de terapias
Jesus Ruiz-Cabello, Jordi Llop, Pedro Ramos Cabrer	Azpitek 2024	986,142.10	2024-2025	Proyecto de adquisición de un sistema avanzado de imagen multimodal para uso preclínico (IRIDIA)





PI (Fellow)	Call	Amount (€)	Period	Full Title
Natalia Baranova, Aitziber López Cortajarena	Línea I+D: Programa de Red guipuzcoana de Ciencia, Tecnología e Innovación	100,000.00	2024-2025	Caracterización molecular del mecanismo de transporte de la proteína ftsz como inhibidor del crecimiento celular y su potencial como diana terapéutica (DINATRAK)
Luis Liz-Marzán, Maurizio Prato	Línea Inversión: Programa de Red guipuzcoana de Ciencia, Tecnología e Innovación	100,000.00	2024-2025	Proyecto de adquisición de un Microscopio Raman con ajuste de confocalidad para el análisis de biomuestras (RAMAN-UP)
Jesus Ruiz-Cabello	Programa Fellows Gipuzkoa de atracción y retención de talento 2024	35,000.00	2024-2025	Molecular Imaging Agents to study Cardiac diseases (MIMA (3))
Dorleta Jimenez de Aberasturi, Aitziber López Cortajarena	Programa Fellows Gipuzkoa de atracción y retención de talento 2024	50,000.00	2024-2025	Desarrollo de biotintas basadas en proteínas de repetición CTPR modificadas con nanopartículas inorgánicas para el estudio de modelos <i>in vitro</i> 4D cardíacos (4DNanoProTEin)
Aitor Manteca González, Aitziber López Cortajarena	Gipuzkoa QUANTUM	120,000.00	2024-2025	QUantum ENgineering of Therapeutic prOtein Binders (QUENTHO)



PI	Call	Amount (€)	Period	Full Title
Dorleta Jimenez de Aberasturi	Talento Innovador 2023	12,000.00	2024-2025	Desarrollo de matrices extracelulares híbridas para su uso en modelos <i>in vitro</i> 3D (MECH3D)



PI	Call	Amount (€)	Period	Full Title
Ander Abarrategi López	Ayudas a la Investigación Biomedica 2023	24,321.40	2024-2025	Study of Primary Tumor Decellularized Extracellular Matrix as a tool for diagnosis and <i>in vitro</i> testing

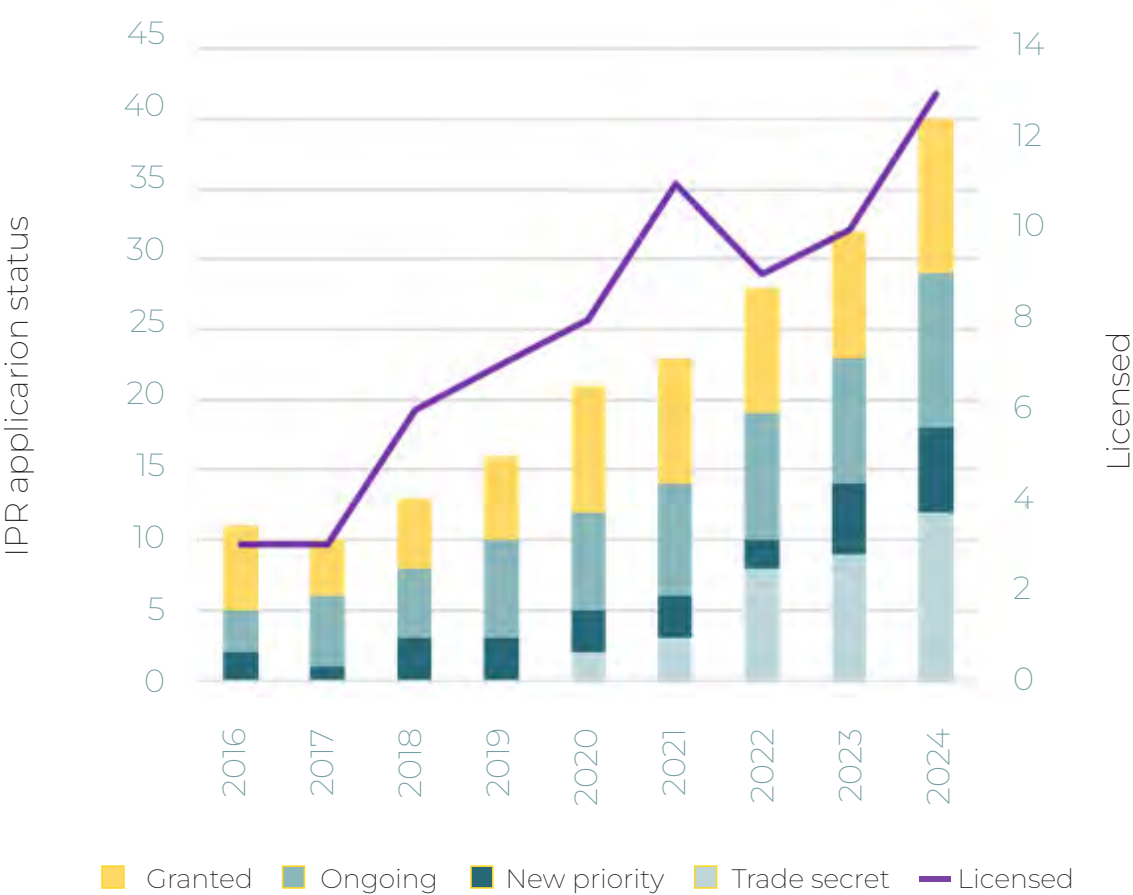


TECHNOLOGY **TRANSFER & INNOVATION**

The Knowledge and Technology Transfer Unit (TTU) is responsible for identifying and advancing technologies that demonstrate strong market potential. The TTU ensures that these innovations are adequately protected and facilitates their transfer by promoting their practical application. In 2024, the dedication of our researchers, supported by the TTU, led to the filing of 6 priority patent applications, the granting of 2 patents, and the establishment of 2 trade secrets. Additionally, 18 service and research contracts, along with 6 technology transfer agreements, were finalized with various companies and institutions. We also incorporated TALDEKI BIOSOLUTIONS, a new spin-off that emerged from the Biomolecular Nanotechnology laboratory led by Aitziber L. Cortajarena. This spin-off specializes in hybrid technologies for biomolecular recognition, and promoted the validation of 5 technologies, some of which are currently seeding the creation of spin-offs.

PATENT PRIORITY APPLICATIONS & OTHER IP

The creation of patents serves as a key indicator of how knowledge is transferred from the Center to society. The chart below illustrates the progression of the intellectual property portfolio over time.



Patent Applications

- 
Engineered proteins, compositions, devices comprising them and use thereof
 M. Fernández Castro, M. Arnaiz González, D. Carriazo Martín, M. Fernandez, P. Blesio, J. Porcayo Loza, A. Villaverde Orejon, A. López Cortajarena, M. C. Morant Miñana.
 EP24383165.8 (23/10/2024)
- 
Tumor model and process of preparation thereof
 P. González Callejo, C. García Astrain, L.M. Liz Marzán.
 EP24382526.2 (16/05/2024)
- 
A method for determining trajectories for 3-D printing tubular structures and for transforming the trajectories into instructions
 C. A. Cortés Acosta, D. Jimenez de Aberasturi, D. Mejía Parra, M. Henriksen-Lacey, M. Zelaia Amilibia, C. García Astrain, G. Berastegi Oñatibia, U. Aizarna Lopetegui.
 EP24383010.6 (20/09/2024)
- 
Conductive proteins
 A. López Cortajarena, M. Fernandez, P. Blesio, J. Porcayo Loza, M. R. Calvo Urbina, L. F. Almonte García, J. D. Cortés Ossa, M. C. Morant Miñana, A. Villaverde Orejon.
 EP24383168.2 (23/10/2024)
- 
Polythiophene polymers doped with tetratricopeptide repeat protein
 A. Dominguez Alfaro, A. López Cortajarena.
 EP24383166.6 (23/10/2024)
- 
A method for generating candidates of amino acids sequences of epitopes
 N. Flechas Manrique, A. Martinez Diez, L. Espinosa Portalés, L. Andrea, S. Mugel, R. Orús, A. López Cortajarena, E. López Martínez, A. Manteca.
 EP24383487.6 (31/12/2024)

Granted Patents & Utility Models

- 
Microfluidic devices and methods
 V. Pavlov, B. Diaz-Buitrago, N. Briz Iceta, G. Bijelic.
 EP4071474B1 (06/03/2024)
- 
Array con forma volumétrica para Imagen de Resonancia Magnética
 P. Villa Valverde, J. M. Ruiz-Cabello Osuna, A. Santos Lleó
 U202330363 (12/09/2024)

Licensed Patents & other IP Rights

- 
Synthesis of nanoparticles for the development of therapeutic and diagnostic imaging strategies. Functional and molecular imaging and Radiochemistry
 Molecular and Functional Biomarkers group
 Trade Secret (01/03/2024)
- 
Metal nanoclusters scaffolds
 A. López Cortajarena, A. Aires Trapote.
 EP17382451.7 (19/12/2024)
- 
Use of methods and materials for the development of diagnostic and therapeutic strategies
 Hybrid and Biofunctional materials group
 Trade secret (01/07/2024)
- 
Use of methods and materials for the development of biofunctional scaffolds for neuroregeneration
 Carbon biotechnology group
 Trade secret (01/12/2024)

INDUSTRIAL & CLINICAL COLLABORATIONS

Collaboration with businesses and healthcare institutions has grown considerably, with several technical services provided through our technological platforms, fostering knowledge transfer to the industry. This effort has resulted in a total of 2,292,605.67 M€ in private funding. The activities are strongly oriented toward innovation, where CIC biomaGUNE plays a key role by contributing its scientific expertise. Ongoing joint initiatives include privately financed research projects, research contracts, and consultancy services.

In 2024, in addition to various technical services offered through our Technological Platforms, several agreements and collaborations with public and private partners were established:

18 Service and Research Agreements

6 Technology Transfer Agreements



SPIN-OFFS



www.aspariaglycomics.com

Asparia Glycomics, established in 2016 as a CIC biomaGUNE spin-off, originated from the Glycotechnology Laboratory led by Niels Reichardt and specializes in cutting-edge glycan analysis technology. It provides isotope-labeled standards, custom kits, software, and reagents for clinical diagnostics and biopharma quality control. Dedicated to improving the identification and quantification of glycan disease markers with greater accuracy and speed, it has achieved financial stability since 2020, earning recognition as a trusted biotech partner for academia and industry. In 2024, Asparia Glycomics had a 737 k€ turnover.



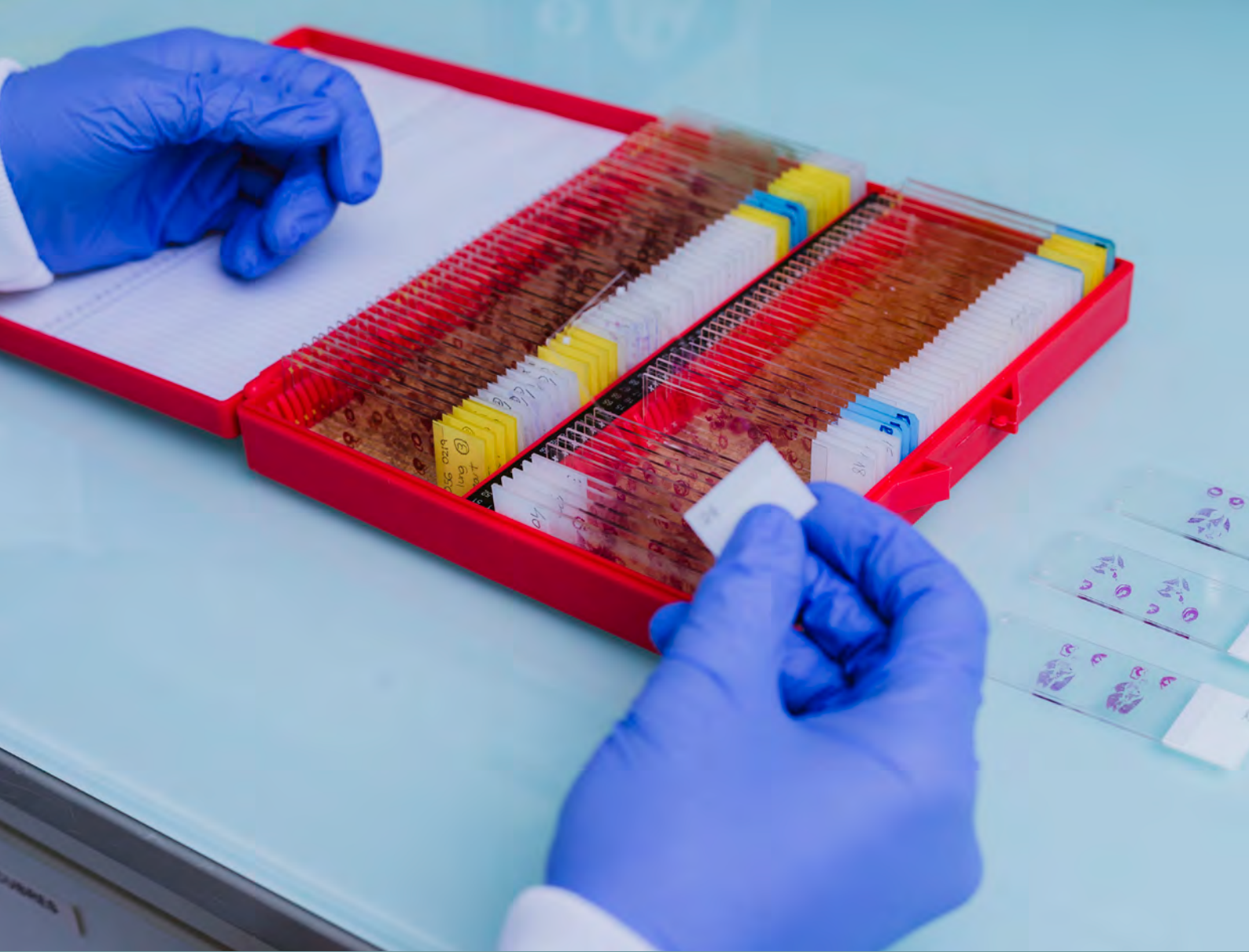
www.hylezitek.es

Incorporated in September 2022, HYLEZITEK is a company 100% owned by CIC biomaGUNE specialized in the provision of services related to research, innovation and development in biomaterials, including the development of longitudinal and multimodal studies in the preclinical field, as well as the development applications in the areas of Preclinical Molecular and Functional Imaging and Nanomedicine. In 2024 HYLEZITEK had a 1.1 M€ turnover.



www.taldeki.com

Taldeki Biosolutions, established in 2024 as a CIC biomaGUNE spin-off, originated from the Biomolecular Nanotechnology Lab led by Aitziber Cortajarena and specializes in hybrid technologies for biomolecular recognition. Its platform, based on Hybrid Mimetic Antigens, enables rapid and specific detection of multiple targets, including antibodies, antigens, proteins, cancer cells, and nanobodies. The technology uses engineered binding protein sequences and metal clusters as reporters (photoluminescent, catalytic, electroactive, magnetic). Taldeki's solutions also include antibody detection and targeted MRI contrast agents for diverse biomolecule detection.



INTERNATIONAL
LEADERSHIP:
SCIENTIFIC EXCELLENCE

SCIENTIFIC OUTPUT

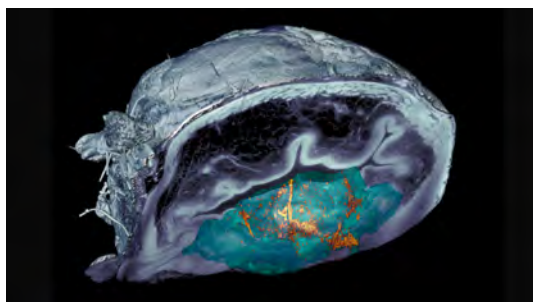
The scientific production of our 12 research groups maintained a remarkable quality and impact. We published over 133 articles in high profile journals. Of these, 50% were led by CIC biomaGUNE researchers, 40% include international collaboration, 40% national collaboration and 20% internal collaboration. The impact factor of the overall production continues increasing, reaching 10.3 in 2024 and 11,233 citations.

HIGHLIGHTS

UREASE-POWERED NANOBOTS FOR RADIONUCLIDE BLADDER CANCER THERAPY

**Simó, C;
Serra-Casablancas, M;
Hortelao, AC; Di Carlo, V;
Guallar-Garrido, S;
Plaza-García, S; Rabanal, RM;
Ramos-Cabrer, P; Yagüe, B;
Aguado, L; Bardia, L; Tosi, S;
Gómez-Vallejo, V; Martín, A;
Patiño, T; Julián, E; Colombelli, J;
Llop, J; Sánchez, S.**

Nat. Nanotech. **2024**, 19, 554-564



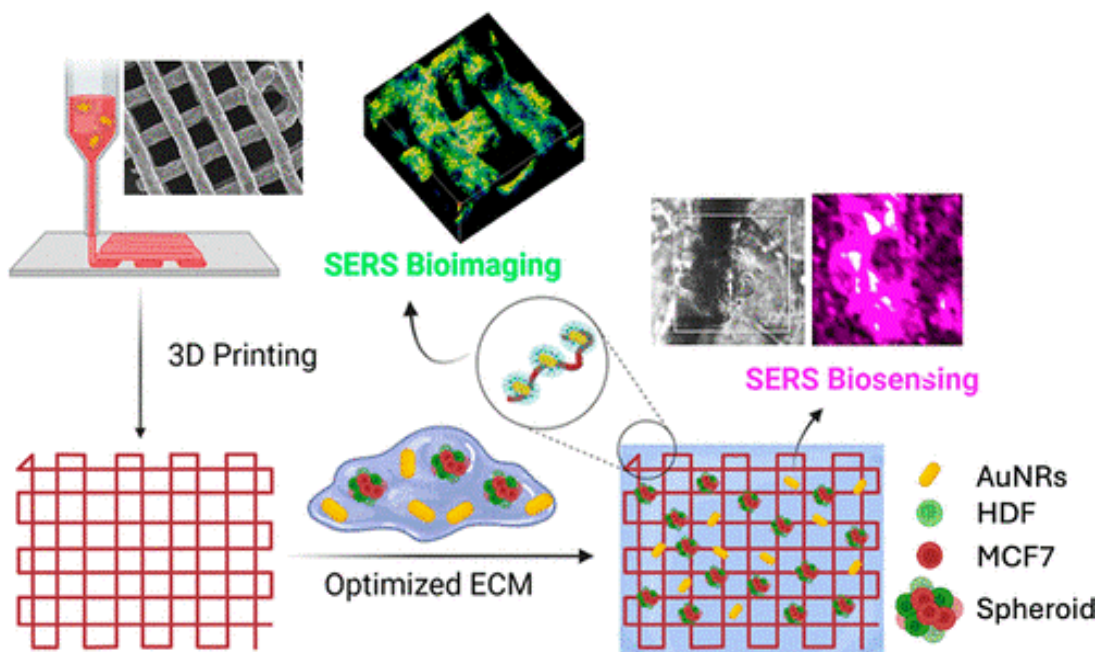
Bladder cancer treatment via intravesical drug administration achieves reasonable survival rates but suffers from low therapeutic efficacy. To address the latter, self-propelled nanoparticles or nanobots have been proposed, taking advantage of their enhanced diffusion and mixing capabilities in urine when compared with conventional drugs or passive nanoparticles. However, the translational capabilities of nanobots in treating bladder cancer are underexplored. Here, we tested radiolabelled mesoporous silica-based urease-powered nanobots in an orthotopic mouse model of bladder cancer. *In vivo* and *ex vivo* results demonstrated enhanced nanobot accumulation at the tumour site, with an eightfold increase revealed by positron emission tomography *in vivo*. Label-free optical contrast based on polarization-dependent scattered light-sheet microscopy of cleared bladders confirmed tumour penetration by nanobots *ex vivo*. Treating tumour-bearing mice with intravesically administered radio-iodinated nanobots for radionuclide therapy resulted in a tumour size reduction of about 90%, positioning nanobots as efficient delivery nanosystems for bladder cancer therapy.

A SCAFFOLD-ASSISTED 3D CANCER CELL MODEL FOR SURFACE-ENHANCED RAMAN SCATTERING-BASED REAL-TIME SENSING AND IMAGING

García-Astrain, C;
Henriksen-Lacey, M; Lenzi, E;
Renero-Lecuna, C; Langer, J;
Piñeiro, P; Molina-Martínez, B;
Plou, J; Jimenez de Aberasturi, D;
Liz-Marzán, LM.

ACS Nano **2024**, 18, 11257-11269

Despite recent advances in the development of scaffold-based three-dimensional (3D) cell models, challenges persist in imaging and monitoring cell behavior within these complex structures due to their heterogeneous cell distribution and geometries. Incorporating sensors into 3D scaffolds provides a potential solution for real-time, *in situ* sensing and imaging of biological processes such as cell growth and disease development. We introduce a 3D printed hydrogel-based scaffold capable of supporting both surface-enhanced Raman scattering (SERS) biosensing and imaging of 3D breast cancer cell models. The scaffold incorporates plasmonic nanoparticles and SERS tags, for sensing and imaging, respectively. We demonstrate the scaffold's adaptability and modularity in supporting breast cancer spheroids, thereby enabling spatial and temporal monitoring of tumor evolution.



THE IN VIVO BIOLOGICAL FATE OF PROTEIN CORONA: A COMPARATIVE PET STUDY OF THE FATE OF SOFT AND HARD PROTEIN CORONA IN HEALTHY ANIMAL MODELS

Villacorta, AM;
Mielcarek, A; Martinez, MG;
Jorge, H; Henschke, A; Coy, E;
Gomez-Vallejo, V;
Llop, J; Moya, SE.

Small **2024**, 20, e2309616

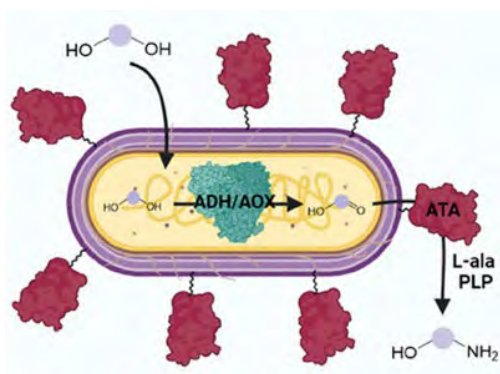
Radiolabeling and nuclear imaging techniques are used to investigate the biodistribution patterns of the soft and hard protein corona around poly (lactic-co-glycolic acid) nanoparticles (PLGA NPs) after administration to healthy mice. Soft and hard protein coronas of ^{131}I -labeled BSA or ^{131}I -labeled serum are formed on PLGA NPs functionalized with either polyethylenimine (PEI) or bovine serum albumin (BSA). The exchangeability of hard and soft corona is assessed *in vitro* by gamma counting exposing PLGA NPs with corona to non-labeled BSA, serum, or simulated body fluid. PEI PLGA NPs form larger and more stable coronas than BSA PLGA NPs. Soft coronas are more exchangeable than hard ones. The *in vivo* fate of PEI PLGA NPs coated with preformed ^{18}F -labeled BSA hard and soft coronas is assessed by positron emission tomography (PET) following intravenous administration. While the soft corona shows a biodistribution similar to free ^{18}F BSA with high activity in blood and kidney, the hard corona follows patterns characteristic of nanoparticles, accumulating in the lungs, liver, and spleen. These results show that *in vivo* fates of soft and hard corona are different, and that soft corona is more easily exchanged with proteins from the body, while hard corona is largely retained on the nanoparticle surface.



ARTIFICIAL SPORES AS MULTI-FUNCTIONAL BIOCATALYSTS TO PERFORM BIOSYNTHETIC CASCADES

**Iturralde, M; Ripoll, M;
Silvio, DD; Gallego, M;
Grajales-Hernández, DA;
López, X; Betancor, L;
López-Gallego, F.**

Adv. Funct. Mater. **2024**, 34, 2406097



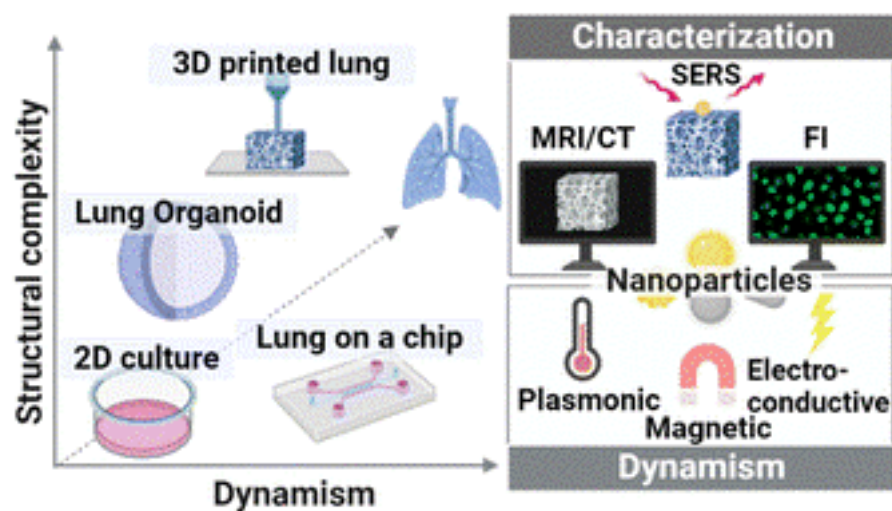
Cells exhibit diverse structural formations such as biofilms and spores, enabling them to acquire novel functionalities. Many of these structures display biomacromolecules, including enzymes, tethered to cell walls to support various extracellular processes. Alternatively, encapsulating single cells with polymer coatings offers a strategy that circumvents the need for genetic engineering while imparting artificial functionalities to cells. Here, a universal method is presented for encapsulating single gram-negative microbes with polymeric coatings based on the ancestral gall ink formed by tannic acid-iron complexes. As a result, synthetic spores are achieved that selectively bind His-tagged enzymes through the formation of unprecedented galloyl/imidazole- Fe^{2+} complexes via ligand substitution demonstrated by density functional theory. These synthetic spores with a thickness of 41.5 ± 4.2 nm and a stiffness of 6.0 ± 3.5 GPa serve as biocatalytic materials for the one-pot oxidative amination of diols into amino alcohols, facilitated by the cooperative catalysis between intracellular endogenous or recombinant oxidoreductases, and an extracellular transaminase from *Pseudomonas fluorescens* displayed at the spore surface. These spores maintain their performance in three consecutive batch cycles. Integrating isolated enzymes onto the surface of engineered microbes coated with polymers offers novel opportunities for synthetic biology, advancing the efficiency of biosynthetic cascades in solid-state environments.

DYNAMIC 3D IN VITRO LUNG MODELS: APPLICATIONS OF INORGANIC NANOPARTICLES FOR MODEL DEVELOPMENT AND CHARACTERIZATION

**Fallert, L; Urigoitia-Asua, A;
Cipitria, A;
Jimenez de Aberasturi, D.**

Nanoscale **2024**, 16, 10880-10900

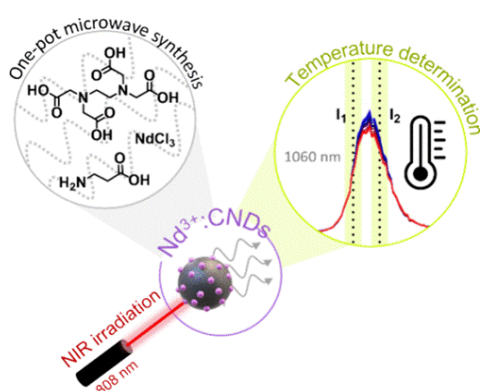
Being a vital organ exposed to the external environment, the lung is susceptible to a plethora of pathogens and pollutants. This is reflected in high incidences of chronic respiratory diseases, which remain a leading cause of mortality world-wide and pose a persistent global burden. It is thus of paramount importance to improve our understanding of these pathologies and provide better therapeutic options. This necessitates the development of representative and physiologically relevant *in vitro* models. Advances in bioengineering have enabled the development of sophisticated models that not only capture the three-dimensional architecture of the cellular environment but also incorporate the dynamics of local biophysical stimuli. However, such complex models also require novel approaches that provide reliable characterization. Within this review we explore how 3D bioprinting and nanoparticles can serve as multifaceted tools to develop such dynamic 4D printed *in vitro* lung models and facilitate their characterization in the context of pulmonary fibrosis and breast cancer lung metastasis.



TEMPERATURE-DEPENDENT LUMINESCENCE OF ND³⁺-DOPED CARBON NANODOTS FOR NANOTHERMOMETRY

**Wetzel, C; Renero-Lecuna, C;
Cardo, L; Liz-Marzán, LM;
Prato, M.**

ACS Appl. Mater. Interfaces **2024**,
16, 35484-35493



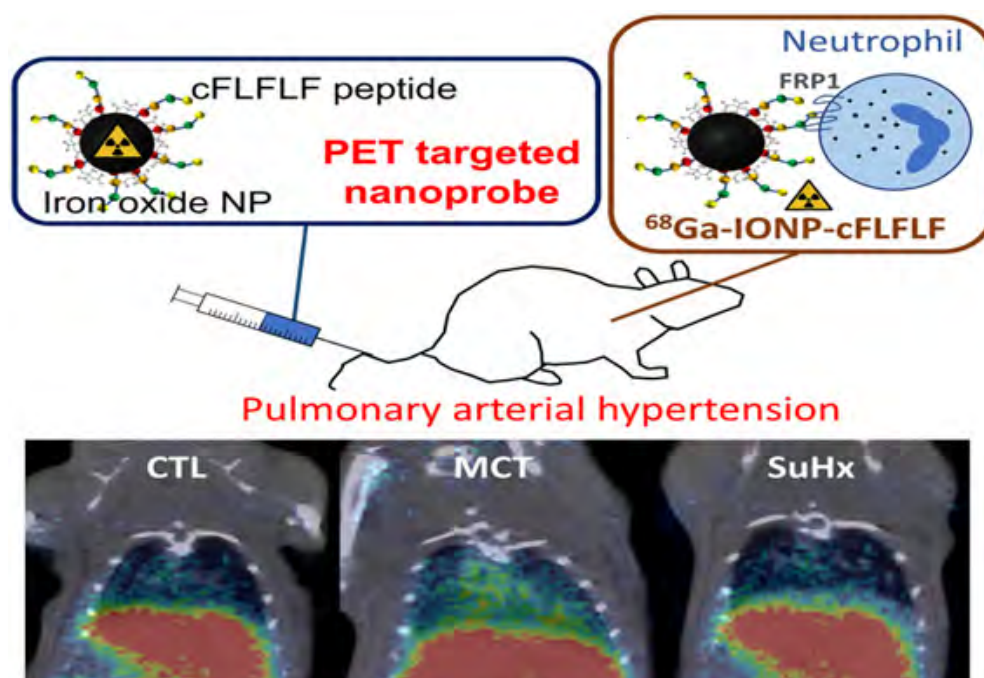
Noncontact optical nanothermometers operating within the biological transparency windows are required to study temperature-sensitive biological phenomena at the nanoscale. Nanoparticles containing rare-earth ions such as Nd³⁺ have been reported to be efficient luminescence-based ratiometric thermometers, however often limited by poor water solubility and concentration-related quenching effects. Herein, we introduce a new type of nanothermometer, obtained by employing low-dimensional carbon nanodots (CNDs) as matrices to host Nd³⁺ ions (NdCNDs). By means of a one-pot procedure, small (~7–12 nm), water-soluble nanoparticles were obtained, with high (15 wt %) Nd³⁺ loading. This stable metal-CND system features temperature-dependent photoluminescence in the second biological window (BW II) upon irradiation at 808 nm, thereby allowing accurate and reversible (heating/cooling) temperature measurements with good sensitivity and thermal resolution. The system possesses remarkable biocompatibility *in vitro* and promising performance at a high penetration depth in tissue models.

MAGNETIC NANORADIOTRACERS FOR TARGETED NEUTROPHIL DETECTION IN PULMONARY ARTERIAL HYPERTENSION

Fadon-Padilla, L;
Miranda-Perez de Alejo, C;
Miguel-Coello, AB;
Beraza, M; Di Silvio, D;
Urkola-Arsuaga, A;
Sanchez-Guisado, MJ;
Aiestaran-Zelaia, I;
Fernandez-Mendez, L;
Martinez-Parra, L; Ismalaj, E;
Berra, E; Carregal-Romero, S;
Ruiz-Cabello, J.

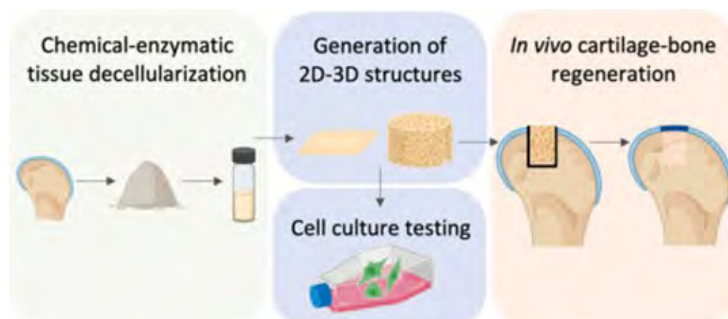
J. Nanobiotechnology **2024**, 22, 709

Pulmonary arterial hypertension (PAH) is a severe disease characterized by elevated blood pressure in the pulmonary artery that can ultimately damage the right ventricle of the heart. PAH is pathophysiologically heterogeneous, which makes early diagnosis and treatment difficult. Inflammation is thought to be an important factor in the development and progression of this disease and may explain some of the observed interindividual differences. In the context of both acute and chronic inflammation, neutrophil recruitment to the lung has been suggested as a potential biomarker for studying PAH progression. However, there are currently no specific probes for its non-invasive *in vivo* detection. The imaging-based gold standard for assessing inflammation is [^{18}F] fluorodeoxyglucose (^{18}F -FDG), which is not cell specific. This highlights the urgent need for more specific molecular probes to support personalized medicine.



DEVELOPMENT OF BIOACTIVE SOLID-FOAM SCAFFOLDS FROM DECELLULARIZED CARTILAGE WITH CHONDROGENIC AND OSTEOGENIC PROPERTIES

Mendibil, U;
López-Morales, Y;
Arnaiz, B;
Ruiz-Hernández, R;
Martín, P; Di-Silvio, D;
García-Urquía, N;
Elortza, F; Azkargorta, M;
Olalde B; Abarrategi, A.



Mater. Today Bio **2024**, 28, 101228

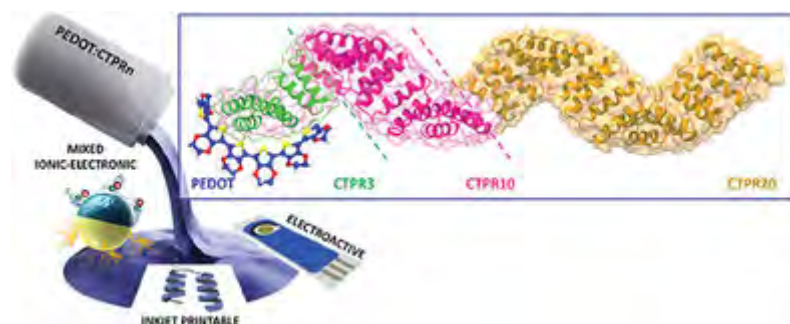
Full osteochondral regeneration remains a major clinical challenge. Among other experimental cartilage regenerative approaches, decellularized cartilage (DCC) is considered a promising material for generating potentially implantable scaffolds useful as cartilage repair strategy. In this work, we focus on screening and comparing different decellularization methods, aiming to generate DCC potentially useful in biomedical context, and therefore, with biological activity and functional properties in terms of induction of differentiation and regeneration. Data indicates that enzymatic and detergents-based decellularization methods differentially affect ECM components, and that it has consequences in further biological behavior. SDS-treated DCC powder is not useful to be further processed in 2D or 3D structures, because these structures tend to rapidly solubilize, or disaggregate, in physiologic media conditions. Conversely, Trypsin-treated DCC powders can be processed to mechanically stable 2D films and 3D solid-foam scaffolds, presumably due to partial digestion of collagens during decellularization, which would ease crosslinking at DCC during solubilization and processing. *In vitro* cell culture studies indicate that these structures are biocompatible and induce and potentiate chondrogenic differentiation. *In vivo* implantation of DCC derived 3D porous scaffolds in rabbit osteochondral defects induce subchondral bone regeneration and fibrocartilage tissue formation after implantation. Therefore, this work defines an optimal cartilage tissue decellularization protocol able to generate DCC powders processable to biocompatible and bioactive 2D and 3D structures. These structures are useful for *in vitro* cartilage research and *in vivo* subchondral bone regeneration, while hyaline cartilage regeneration with DCC alone as implantable material remains elusive.

ENGINEERING PROTEINS FOR PEDOT DISPERSIONS: A NEW HORIZON FOR HIGHLY MIXED IONIC-ELECTRONIC BIOCOMPATIBLE CONDUCTING MATERIALS

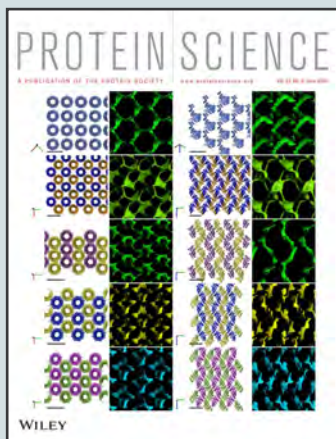
Dominguez-Alfaro, A;
Casado, N; Fernandez, M;
Garcia-Esnaola, A;
Calvo, J; Mantione, D;
Calvo, MR; Cortajarena, AL.

Small **2024**, 20, e2307536

Poly (3,4-ethylenedioxythiophene) (PEDOT) doped with polystyrene sulfonate (PSS) is the most used conducting polymer from energy to biomedical applications. Despite its exceptional properties, there is a need for developing new materials that can improve some of its inherent limitations, e.g., biocompatibility. In this context, doping PEDOT is proposed with a robust recombinant protein with tunable properties, the consensus tetratricopeptide repeated protein (CTPR). The doping consists of an oxidative polymerization, where the PEDOT chains are stabilized by the negative charges of the CTPR protein. CTPR proteins are evaluated with three different lengths (3, 10, and 20 identical CTPR units) and optimized varied synthetic conditions. These findings revealed higher doping rate and oxidized state of the PEDOT chains when doped with the smallest scaffold (CTPR3). These PEDOT:CTPR hybrids possess ionic and electronic conductivity. Notably, PEDOT:CTPR3 displayed an electronic conductivity of 0.016 S cm^{-1} , higher than any other reported protein-doped PEDOT. This result places PEDOT:CTPR3 at the level of PEDOT-biopolymer hybrids, and brings it closer in performance to PEDOT:PSS gold standard. Furthermore, PEDOT:CTPR3 dispersion is successfully optimized for inkjet printing, preserving its electroactivity properties after printing. This approach opens the door to the use of these novel hybrids for bioelectronics.



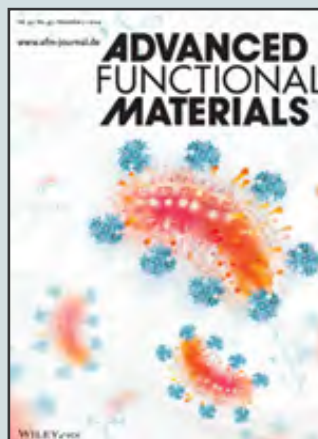
COVER PAGES



Diverse crystalline protein scaffolds through metal-dependent polymorphism

Liutkus, M; Sasselli, IR; Rojas, AL; Cortajarena, AL.

Protein Sci. 2024, 33, e4971



Artificial Spores as Multi-Functional Biocatalysts to Perform Biosynthetic Cascades

Iturralde, M; Ripoll M; di Silvio D; Gallego M; Grajales-Hernández D.A; López X; Betancor L; López-Gallego F.
Adv. Func. Mater. 2024, 34, 2470261

EDITED BOOKS & BOOK CHAPTERS



Handbook of the Extracellular Matrix: Biologically-Derived Materials

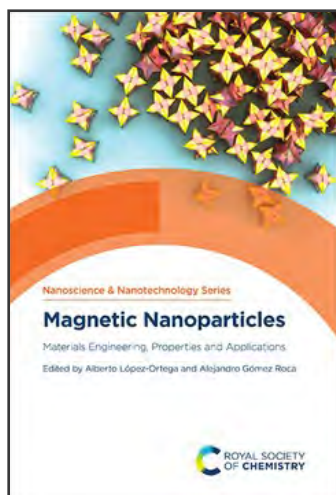
Springer, 2024

ISBN: 978-303156363-8

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Pp 109-141

Mendibil U; Ruiz-Hernández R; Arnaiz B; Khatami N; Abarrategi A.



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Marcano L; Gandia D; Orue I; García-Prieto A; Abrudan R; Muela A; Fdez-Gubieda M.L; Valencia S.



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Roy S; Zhu D; Parak W.J; Feliu N.

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Hartmann R; Weidenbach M; Neubauer M; Fery A; Parak W.J.

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Pp 1239 - 1256

Carregal-Romero S; Guardia P; Yu X; Hartmann R; Pellegrino T; Parak W.J.

Chapter: Basic Physicochemical Properties of Polyethylene Glycol Coated Gold Nanoparticles that Determine Their Interaction with Cells

Pp 759 - 770

Pino P.D; Yang F; Pelaz B; Zhang Q; Kantner K; Hartmann R; Baroja N.M; Gallego M; Möller M; Manshian B.B; Soenen S.J; Riedel R; Hampp N; Parak W.J.

Chapter: Polymer-Coated Nanoparticles Interacting with Proteins and Cells: Focusing on the Sign of the Net Charge

Pp 833 – 860

Hühn D; Kantner K; Geidel C; Brandholt S; Cock I.D;
Soenen S.J.H; Rivera Gil P; Montenegro J.-M; Braeckmans K;
Müllen K.; Nienhaus G.U; Klapper M; Parak W.J.

Chapter: Surface Functionalization of Nanoparticles with Polyethylene Glycol: Effects on Protein Adsorption and Cellular Uptake

Pp 861 – 894

Pelaz B; Pino P.D; Maffre P; Hartmann R; Gallego M;
Rivera-Fernandez S; Fuente J.M.L; Nienhaus G.U; Parak W.J.

Chapter: *In Vivo* Integrity of Polymer-Coated Gold Nanoparticles

Pp 1019 – 1032

Kreyling W.G; Abdelmonem A.M; Ali Z; Alves F; Geiser M;
Haberl N; Hartmann R; Hirn S; De Aberasturi D.J; Kantner K;
Khadem-Saba G; Montenegro J.-M; Rejman J; Rojo T; Ufartes R;
Wenk A; Parak W.J.

Chapter: Tracking Stem Cells and Macrophages with Gold and Iron Oxide Nanoparticles - the Choice of the Best Suited Particles

Pp 911 – 942

Sun X; Gamal M; Nold P; Said A; Chakraborty I; Pelaz B;
Schmied F; Pückler K.V; Figiel J; Zhao Y; Brendel C; Hassan M;
Parak W.J; Feliu N.

Chapter: Triple-Labeling of Polymer-Coated Quantum Dots and Adsorbed Proteins for Tracing their Fate in Cell Cultures

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Carrillo-Carrion C; Bocanegra A.I; Arnaiz B; Feliu N; Zhu D;
Parak W.J.

Chapter: Physicochemical Properties of Protein-Coated Gold Nanoparticles in Biological Fluids and Cells before and after Proteolytic Digestion

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Chanana M; Rivera Gil P; Correa-Duarte M.A; Liz-Marzán L.M;
Parak W.J.

Chapter: Protein Corona Formation around Nanoparticles - From the Past to the Future

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Pino P.D; Pelaz B; Zhang Q; Maffre P; Nienhaus G.U; Parak W.J.

Chapter: *In situ* Detection of the Protein Corona in Complex Environments

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Carril M; Padró D; Pino P.D; Carrillo-Carrion C; Gallego M; Paraka W.J.

Chapter: Control of Wnt/ β -Catenin Signaling Pathway *In Vivo* via Light Responsive Capsules

Pp 1221 – 1238

Ambrosone A; Marchesano V; Carregal-Romero S; Intartaglia D; Parak W.J; Tortiglione C.

Chapter: Colloidal Stability and Surface Chemistry Are Key Factors for the Composition of the Protein Corona of Inorganic Gold Nanoparticles

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Johnston B.D; Kreyling W.G; Pfeiffer C; Schäffler M; Sarioglu H; Ristig S; Hirn S; Haberl N; Thalhammer S; Hauck S.M; Semmler-Behnke M; Epple M; Hühn J; Pino P.D; Parak W.J.

Chapter: Colloidal Gold Nanoparticles Induce Changes in Cellular and Subcellular Morphology

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Ma X; Hartmann R; De Aberasturi D.J; Yang F; Soenen S.J.H; Manshian B.B; Franz J; Valdeperez D; Pelaz B; Feliu N; Hampp N; Riethmuller C; Vieker H; Frese N; Götzhäuser A; Simonich M; Tanguay R.L; Liang X.-J; Parak W.J.

Chapter: Selected Standard Protocols for the Synthesis, Phase Transfer, and Characterization of Inorganic Colloidal Nanoparticles

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Hühn J; Carrillo-Carrion C; Soliman M.G; Pfeiffer C; Valdeperez D; Masood A; Chakraborty I; Zhu L; Gallego M; Yue Z; Carril M; Feliu N; Escudero A; Alkilany A.M; Pelaz B; Pino P.D; Parak W.J.

Chapter: Tumour Homing and Therapeutic Effect of Colloidal Nanoparticles Depend on the Number of Attached Antibodies

Pp 427 – 470

Colombo M; Fiandra L; Alessio G; Mazzucchelli S; Nebuloni M;
Palma C.D; Kantner K; Pelaz B; Rotem R; Corsi F; Parak W.J;
Prosperi D.

Chapter: Biodegradation of Bi-Labeled Polymer-Coated Rare-Earth Nanoparticles in Adherent Cell Cultures

Pp 1033 – 1060

Liu Z; Escudero A; Carrillo-Carrion C; Chakraborty I; Zhu D;
Gallego M; Parak W.J; Feliu N.

Chapter: Laterally and Temporally Controlled Intracellular Staining by Light-Triggered Release of Encapsulated Fluorescent Markers

Pp 1209 – 1220

Kantner K; Rejman J; L. Kraft K.V; Soliman M.G; Zyuzin M.V;
Escudero A; Pino P.D; Parak W.J.

Chapter: The Toxicity of Silver Nanoparticles Depends on Their Uptake by Cells and Thus on Their Surface Chemistry

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Caballero-Díaz E; Pfeiffer C; Kastl L; Rivera-Gil P; Simonet B;
Valcárcel M; Jimenez-Lamana J; Laborda F; Parak W.J.



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Phungula, A; Zuffi, S; Thongsom, S;
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AWARDS & RECOGNITIONS

International recognition of academic excellence is also reflected by prestigious awards.

CIC BIOMAGUNE ACCREDITATIONS



AAALAC Accreditation to CIC biomaGUNE's animal facilities
CIC biomaGUNE received the **AAALAC accreditation** in **2015** for the first time, and the accreditation was renewed in **2018, 2021** and **2024**.



The Molecular & Functional Imaging Facility renewed its recognition as **Singular Scientific and Technical Infrastructure** (ICTS in Spanish).



Certification of CIC biomaGUNE RD&I management system according to **UNE 166002:2021** standard.



Seal of Excellence in Human Resources **"HR Excellence in Research"** from the European Commission since 2021.



In 2018, CIC biomaGUNE earned the accreditation as a **"María de Maeztu Unit of Excellence"**, the highest recognition of scientific excellence in Spain awarded by the Spanish State Research Agency (AEI).

AWARDS, ACADEMY MEMBERSHIPS AND HONORARY DEGREES

- **Jordi Llop** named **President of the European Society for Molecular Imaging**. 18/07/2024
- **Maurizio Prato**, received the **Raffaele Piria Medal** by the Italian Chemical Society. 26/08/2024
- **Guillermo González-Rubio**, alumni of CIC biomaGUNE, awarded a **ERC Starting Grant**. 26/09/2024
- **Luis M. Liz-Marzán**, elected **International Member Accademia dei Lincei**. 15/11/2024
- **Jordi Llop** selected as finalist with the Ventipet project in **the Manuel Laborde Awards**. 29/11/2024



BEST PHD THESES

1

Cristina Simó Costa, received the **ESMI Award for outstanding PhD Thesis** at EMIM 2024. 14/03/2025

2

Paula Isla Gangoiti, awarded **Best Masters Thesis in Medicine** in the 2nd Edition of the University of Cantabria Innovation Chair Project. 06/05/2024

BEST TALK/POSTER



María Gómez Martínez,
awarded with the **Best Oral
Communication Award** at
the 5th Annual Young Spanish
Molecular Imaging Network
(ySMIN) meeting. 09/02/2024



Maialen Iturralde Adarraga,
awarded **Best Plenary Oral
Communication** in the I
PhD Day of the UPV/EHU.
22/04/2024



Rocío López-Domene,
awarded **Best Oral
Presentation** in BioNEXT – I
AEBIN Young Researchers
Symposium. 26/03/2024



Gabriela Guedes Faria,
awarded **Best Poster Award** in
the ChemBio VII. 21/11/2024

EMBO FELLOWSHIPS

Ane Urigoitia Asua, PhD student at the Hybrid Biofunctional Materials group, received an EMBO Fellowship in 2024 to spend 3 months (from 01/09/2024 to 30/11/2024) at the Stanford University, California, at Prof. DeSimone's group. She worked in the frame of the project "CLIP 3D printing of high-resolution microvascular channels for ALI pulmonary modeling" on the use of unique 3D-printing technique developed by Prof. DeSimone's group (CLIP printing) to print polymeric hydrogels with hollow microchannels at high resolution. These microchannels are valuable to develop geometrically accurate air-liquid interface (ALI) systems in pulmonary modeling, where the air side (alveoli) and liquid side (capillaries) interconnect.

	2021	2022	2023	2024
Awards, academy memberships and honorary degrees	7	5	9	5
Best PhD Theses		2	6	2
Best talk/poster	8	10	3	4
Embo fellowships		3	4	1
Total	15	20	22	12



TRAINING & CAREER DEVELOPMENT

TRAINING

In 2024 there have been **105** active **PhD thesis**, **21** of them defended during the year. Our researchers performed **47** secondments at collaborating institutions, and we hosted **135** stays of visiting researchers. The Center has organized **65** seminars, **6** workshops/conferences and our researchers have participated as co-organizers of **8** international conferences.

POSTDOCTORAL PROGRAM

Postdoctoral researchers are hired at CIC biomaGUNE for periods of 1-5 years. During this time, postdoctoral researchers broaden and deepen their research skills and boost their career perspectives so they can become independent research scientists. Researchers gain training-through-research, by means of individual personalized projects under the guidance of a group leader and receive hands-on-training for developing scientific skills and transferrable skills.

PhD PROGRAM

The objective of CIC biomaGUNE's PhD Program is to provide PhD students with top-quality multidisciplinary training at the interface between biology, chemistry, nanobiotechnology and materials science. The students benefit from international training and are exposed to different research areas. The training program offers weekly lectures by leading scientists, technical training courses on a broad range of scientific techniques and instrumentation, opportunities for short stays at renowned international research institutions, as well as complementary training in soft skills to prepare doctoral candidates to become highly qualified, autonomous and skilled professionals. The joint training of PhD candidates fosters closer ties and cooperation between research groups and researchers of the institutions involved.

In partnership with the **University of the Basque Country (UPV/EHU)**, CIC biomaGUNE participates in the following Doctoral programs:

- **Synthetic & Industrial Chemistry**
- **Applied Chemistry & Polymeric Materials**
- **Molecular Biology & Biomedicine**
- **Medicine & Surgery**
- **Biomedical Research**

INDUSTRIAL PHD SCHEME

CIC biomaGUNE has agreements with industrial partners to conduct industrially oriented.

CO-SUPERVISED PHD SCHEME

Since 2016, CIC biomaGUNE is running a program of co-supervised (and co-funded) PhD theses, in collaboration with other research institutions, technology centers and enterprises in the Basque Country. In **2024, 45 PhD theses were co-directed with the following institutions:**

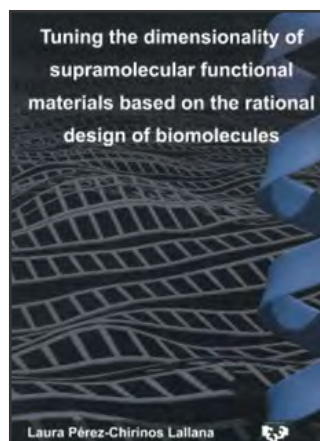
- **ACHUCARRO** - Basque Center for Neuroscience
- **BCBL** - Basque Center on Cognition Brain and Language
- **BIOFISIKA**
- **CIC bioGUNE**
- **CIC nanoGUNE**
- **CIDETEC**
- **CFM** - Materials Physics Center
- **DIPC** - Donostia International Physics Center
- **IIS BIOGIPUZKOA**
- **GAIKER**
- **LEARTIKER**
- **POLYMAT** - Basque Center for Macromolecular Design & Engineering
- **TECNALIA**

COMPLETED PHD THESES

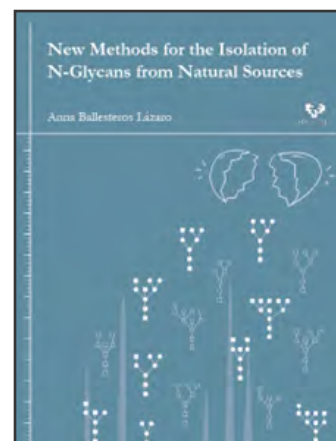
During 2024, **21** students obtained their PhD at CIC biomaGUNE.



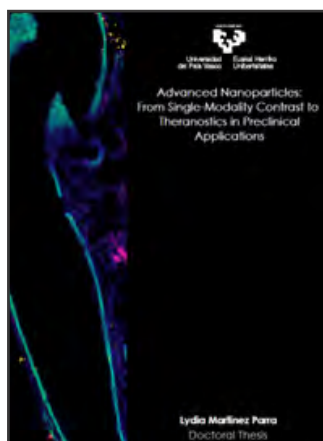
Paula Vázquez Aristizabal
Development of customized bioinks for 3D printed dynamic cancer models
 Supervisor: Ander Izeta & Luis M. Liz-Marzán
 Defense Date: 12/01/2024



Laura Pérez-Chirinos Lallana
An experimental and computational approach for the development of self-assembled hybrid biomaterials
 Supervisor: Ivan Sasselli & Aitziber L. Cortajarena
 Defense Date: 26/01/2024



Anna Ballesteros
New methods for the isolation of N-glycans
 Supervisor: Niels Reichardt
 Defense Date: 09/02/2024



Lydia Martínez Parra
Advanced Nanoparticles: From Single-Modality Contrast to Theranostics in Preclinical Applications
 Supervisor: Lucía Cardo & Susana Carregal
 Defense Date: 16/02/2024



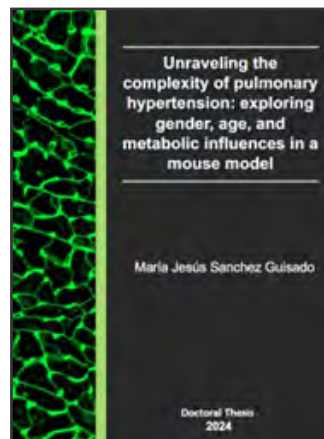
Bruno Espuche
Tailored nanogels by precipitation polymerization to open the therapeutic window of gene delivery
 Supervisor: Marcelo Calderón & Sergio Moya
 Defense Date: 16/02/2024



María Regato
Multi Responsive hydrogels for biomedical applications
 Supervisor: David Mecerreyes & Sergio Moya
 Defense Date: 21/02/2024



Tanja Ursula Lüdtk
Biological Fate Studies of Self-Assembled Nanoparticles in Complex Fluids using Fluorescence Correlation Spectroscopy
 Supervisor: Sergio Moya
 Defense Date: 23/02/2024



María Jesús Sánchez Guisado
Unraveling the complexity of pulmonary hypertension: exploring gender, age, and metabolic influences in a mouse model
 Supervisor: Jesús Ruiz-Cabello & Pedro Ramos
 Defense Date: 29/02/2024



Francisco Javier Santiago Arcos
Assembly and Characterization of Heterogeneous Biocatalyst for the Manufacturing of Omega Hydroxy Acids
 Supervisor: Fernando López Gallego & Aitziber L. Cortajarena
 Defense Date: 15/04/2024



Raquel Ruiz Hernández
From bone development to regenerative approaches: Biocompatible and biomimetic scaffolds to understand and boost bone formation
 Supervisor: Ander Abarrategi & Sergio Moya
 Defense Date: 26/04/2024



David Vila Liarte
Design of chiral nanostructures with plasmonic optical activity through colloidal self-assembly
 Supervisor: Luis M. Liz-Marzán
 Defense Date: 27/06/2024



Pablo Salvador Valera Sapeña
Analysis of cancer biomarkers in complex tissue by surface-enhanced Raman spectroscopy
 Supervisor: Arkaitz Carracedo (CIC bioGUNE) & Luis M. Liz-Marzán
 Defense Date: 28/06/2024



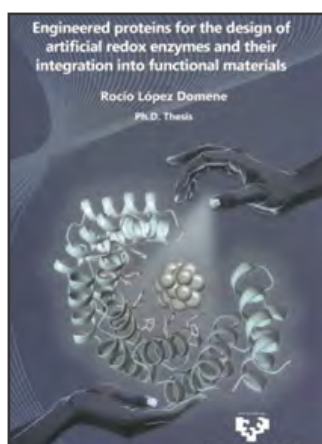
Gabriela Guedes Faria
Protein-based nanomaterials as multifunctional MRI contrast agents
 Supervisor: Aitziber L. Cortajarena
 Defense Date: 05/07/2024



Michele Cesco
Advanced Carbon Nanodots Doped with metals and Fluorine as Dual Fluorescence/MR Imaging agents
 Supervisor: Maurizio Prato & Lucía Cardo
 Defense Date: 19/07/2024



Uxue Aizarna Lopetegui
Smart hybrid inorganic-organic multifunctional bioinks and their application in 3D printing of *in vitro* models
 Supervisor: Dorleta Jimenez de Aberasturi & Malou Henriksen-Lacey
 Defense Date: 18/10/2024



Rocío López Domene
Engineered proteins for the design of artificial redox enzymes and their integration into functional materials

Supervisor: Ana Beloqui (Polymat) & Aitziber L. Cortajarena
 Defense Date: 22/10/2024



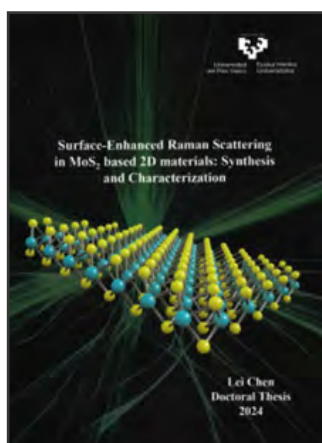
María Villuendas
Evaluation of the potential of nanoclusters stabilised in proteins with fluorescence properties as bio-recognition systems

Supervisor: Garbiñe Olabarria (Gaiker) & Aitziber L. Cortajarena
 Defense Date: 31/10/2024



Irati Aiestaran Zelaia
Exploring the Potential of Mitochondrial Augmentation from Molecular Mechanisms to Organ Physiology

Supervisor: Ian Holt (Biogipuzkoa) & Jesús Ruiz-Cabello
 Defense Date: 31/10/2024



Lei Chen
Surface-Enhanced Raman Scattering in MoS2 based 2D materials: Synthesis and Characterization

Supervisor: Maurizio Prato, Ikerbasque
 Defense Date: 27/11/2024



Zuriñe Blasco Iturri
The interplay between endothelial cells and smooth muscle cells mediated by Notch3-Jag1/2 signaling: A Pivotal Mechanism in Vascular Remodeling and Lung Fibrosis-Driven Pulmonary Hypertension

Supervisor: Ana Pardo-Saganta (Institute for Lung Health, ILH) & Jesús Ruiz-Cabello
 Defense Date: 08/11/2024



Kyle Van Gordon
Mechanistic Investigation of the Seeded Growth on Gold Nanoparticles

Supervisor: Luis M. Liz-Marzán
 Defense Date: 05/12/2024

TRAINING INITIATIVES FOR UNDERGRADUATE STUDENTS

MASTER'S FELLOWSHIP PROGRAM

CIC biomaGUNE has agreements with several universities (which are the degree-grating bodies) in different Master's programs. Additionally, in partnership with the **University of the Basque Country (UPV/EHU)**, CIC biomaGUNE researchers participate in the following MSc courses by providing lectures and direction of master's thesis:

- Molecular Biology & Biomedicine
- Nanoscience
- Chemistry & Polymers

The **Master's Fellowship Program** aims at offering scholarships to highly qualified master's students to carry out their Master's Project. In **2024, 4 fellowships** have been granted.

SUMMER RESEARCH PROGRAM

During the summer period, undergraduate students with a background in Chemistry, Biology and Materials Science are hosted at CIC biomaGUNE's laboratories. The undergraduates work alongside pre- and post-doctoral researchers and receive high-level training while working on a research project, but also by attending weekly group meetings and seminars. At the end of the traineeship, the students are required to prepare a short report and a presentation summarizing their research and results.

The **Summer Research Program** aims at offering scholarships to highly qualified students in their second and third years of study, to carry out research stays at CIC biomaGUNE during the summer. In **2024, 10** fellowships were granted.

VOCATIONAL TRAINING PROGRAM

CIC biomaGUNE has agreements with **CPES, CESA, BHIP, Don Bosco, CEBANC and Colegio Inmakulada Ikastetxea**, centers for Intermediate and Superior level vocational training in the fields of Chemistry or Biosciences to host training internships of students. Several training placements take place every year at different laboratories of the Center. Selected undergraduates are mentored and supervised by postdoctoral researchers or PhD students and receive hands-on training.

RESEARCH SECONDMENTS

In the framework of different national and international projects, CIC biomaGUNE has established collaborations with international institutions to **second** and **host research stays of PhD students and postdoctoral researchers**. During 2024, our researchers performed 47 secondments at collaborating partners and we hosted **135** stays of visiting researchers.

	2019	2020	2021	2022	2023	2024
Research stays from CIC biomaGUNE	23	16	12	38	37	47
Research stays to CIC biomaGUNE	110	86*	97	111	115	135
• Experienced Researchers Visiting Professors	12	10	7	21	13	19
• Erasmus placements	8	1	6	4	6	1
• Summer placements	15		17	7	4	13
• Vocational Training	5	8	6	6	7	12

* Many of the visits in 2020 were interrupted due to the COVID-19 pandemic.

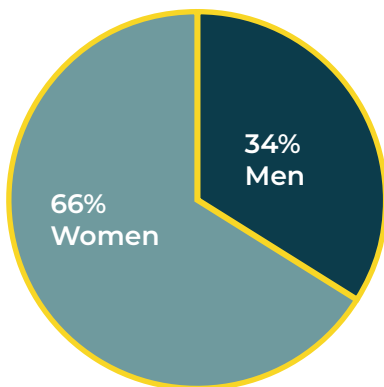
SEMINARS & INTERNAL TRAINING

CIC biomaGUNE runs an annual program of scientific seminars, which includes:

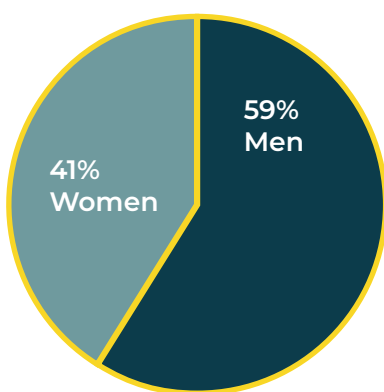
- **International seminars** delivered by internationally recognized researchers of varying scientific backgrounds and fields.
- **Postdoctoral seminars** delivered by selected postdoctoral fellows to share progress in each of our laboratories with the rest of the Center.
- **PhD seminars** delivered by PhD students of the Center.
- **Training seminars** delivered by CIC biomaGUNE's PIs or Platform Managers, aimed at strengthening the technical training program and soft skills training.

These actions aim at discussing recent developments, fostering internal and external interactions and paving the way toward future collaborations as well as contributing to the career development of our researchers. Altogether, these programs contribute to the career development of our researchers. During 2024, **65** Seminars & Soft Skills Trainings and **385** Internal Scientific & Technology Trainings were delivered, with a total of **1,212** participants reached.

Training participants 1212



Invited speakers 41



Training type	Number of events
CIC biomaGUNE Seminar	22
Open Group Seminar	5
Postdoctoral & PhD Seminar	13
Soft Skills Seminar	24
Christmas Lecture	1
Internal Scientific & Technology Trainings	385

SEMINARS

- 24/01/2024**
Neutron scattering to investigate complex systems formed by bio-macromolecules
Prof. José María Porro & Dr. Viktor Petrenko
 BCMaterials
- 30/01/2024**
A sweet journey into the quantification, synthesis and biological roles of carbohydrates
Jon Quintana CIC biomaGUNE
- 31/01/2024**
3D skin bioprinting: unde venis et quo vadis?
Prof. José Luis Jorcano Noval University Carlos III
- 07/02/2024**
New methods for the isolation of N-glycans from natural sources
Anna Ballesteros CIC biomaGUNE
- 14/02/2024**
Glycosyltransferase Bump-and-hole Engineering to Understand Glycosaminoglycan Biosynthesis
Dr. Ben Schumann The Francis Crick Institute
- 20/02/2024**
Biomedical imaging strategies for measuring the kinetics of therapeutic nanoparticles *in vitro* and *in vivo*
Prof. Marc-André Fortin
 Département de Génie des M.M.Matériaux, Université Laval
- 21/02/2024**
Computational protein design and engineering
Dr. Francesca Peccati CIC bioGUNE
- 04/03/2024**
Blender (3D) - Basic Guillermo Roa
- 05/03/2024**
Spatial Organization of Immobilized Multienzyme Systems Improves the Deracemization of Alkyl Glyceryl Ethers
Daniel Grajales CIC biomaGUNE
- 12/03/2024**
Is My Professional Success the Result of Ability and Competency or Just Plain Luck?
Prof. Luis Echegoyen ICIQ

18/03/2024

Artificial Intelligence awareness session KPMG

20/03/2024

Enhancing monoclonal antibody properties through the use of human scaffold proteins
Dr. Edurne Rujas Faculty of Pharmacy (UPV/EHU)

26/03/2024

Materials for Bone and Cartilage Regeneration
Neda Khatami CIC biomaGUNE

03/04/2024

Nanovex; from University Research to cutting-edge cosmetics
Rebeca Alonso Bartolomé Nanovex

08/04/2024

Blender (3D) - Advanced
Guillermo Roa Guillermo Roa

17/04/2024

Cardiac Tissue Engineering - Building human myocardium in the lab through unravelling nature's design specifications
Dr. Manuel M. Mazo Vega
Cima University of Navarra

23/04/2024

Directional freezing of biological matter: implications in biofabrication and cryobiology
Prof. Francisco M. Fernandes
Sorbonne University

24/04/2024

Primeros auxilios y desfibrilador automático
IMQ

07/05/2024

Electroconductive Copolymer Films (PPy-PPyCOOH) as Biocompatible Platforms for Electrochemical Applications
Eduart Andrés Gutiérrez Pineda
CIC biomaGUNE

09/05/2024

Publishing with impact – top tips from a journal editor
Prof. Edward Gardner Royal Society of Chemistry

14/05/2024

Engineering photosynthetic light harvesting systems for enhanced light use efficiency and environmental sustainability
Prof. Roberto Bassi
University of Verona

15/05/2024

Understanding and predicting prostate cancer aggressiveness through the deconstruction of cell signaling and metabolism
Arkaitz Carracedo CIC bioGUNE

21/05/2024

Nanovex; from University Research to cutting-edge cosmetics
Prof. Rebeca Alonso Bartolomé Nanovex

22/05/2024

The Delicate Interplay Between Light, Interfaces and Design: The Complex Dance that Allows 3D Printing to Scale to Manufacturing
Prof. Joseph DeSimone Stanford University

29/05/2024

Gene therapy for liver inherited diseases
Gloria González-Aseguinolaza
CIMA, University of Navarra

30/05/2024

Chirality in organic-inorganic materials: liquid crystal-based composites and multidentate chirality inducers in chiral nanorod synthesis
Prof. Wiktor Lewandowski University of Warsaw

31/05/2024

Maximizando el impacto en Horizonte Europa: Estrategias y Prácticas orientadas a propuestas de Biomedicina y Salud Qi Europe

04/06/2024

Neuroimaging and nanotechnology to better understand the brain and to treat its diseases
Pedro Ramos Cabrer CIC biomaGUNE

11/06/2024

Nanotechnology of Cell Communication
Prof. Paolo Bergese University of Brescia

12/06/2024

Computational Modelling of Protein, DNA and Membrane Processes
Prof. Juan José Nogueira
Autonomous University of Madrid

18/06/2024

Training on CV writing and interview skills
Skills4science

19/06/2024

Identifying actionable vulnerabilities to tackle cancer resistance
Dr. Ana Ruiz-Saenz CIC bioGUNE

- 
26/06/2024
Analysis of Cancer Biomarkers in Complex Tissue by Surface-Enhanced Raman Spectroscopy
Pablo Salvador Valera Sapena CIC biomaGUNE
- 
03/07/2024
Protein-based nanomaterials as multifunctional MRI contrast agents
Gabriela Guedes Faria CIC biomaGUNE
- 
04/07/2024
Radiochemistry in action: Exploring diseases through nuclear imaging
Claudia Espósito Zapero CIC biomaGUNE
- 
08/07/2024
Gestión y Desarrollo de Personas
Janire Jaurrieta Impulsa Desarrollo
- 
10/07/2024
New therapeutic approach to halt drug resistance in cancer **Dr. Maria D. Mayán** CINBIO
- 
18/07/2024
Dynamic *in vitro* 4D bioprinted models
Ane Urigoitia Asua CIC biomaGUNE
- 
29/08/2024
Estudios con animales: Diseño experimental y cálculo de tamaño muestral **Biogipuzkoa**
- 
04/09/2024
Dynamic Nucleic Acid Nanostructures and Systems: From Fundamental Concepts to Applications **Prof. Itamar Willner**
 The Hebrew University of Jerusalem
- 
04/09/2024
Can we make Biocatalysis more sustainable and efficient? And How? **Dr. Ana I. Benítez-Mateos**
 ETH Zurich. Department of Chemistry and Applied Biosciences
- 
11/09/2024
Complex coacervate-based adhesives and scaffolds
Prof. Dr. Marleen Kamperman
 University of Groningen
- 
08/10/2024
Emergencias y Extinción de Incendios **IMQ**
- 
08/10/2024
PhD thesis presentation
Uxue Aizarna CIC biomaGUNE
- 
09/10/2024
Almacenamiento de Químicos **IMQ**
- 
09/10/2024
Sugars and Enzymes
Prof. Ben Davis The Rosalind Franklin Institute
- 
22/10/2024
Unraveling the complexity of pulmonary hypertension
Dr. María Jesús Sánchez Guisado
 CIC biomaGUNE
- 
23/10/2024
Glycomimetic-mediated targeted delivery to Langerhans cells for transdermal vaccination
Dr. Christoph Rademacher University of Vienna
- 
24/10/2024
DNA nanotechnology for nanophotonics
Prof. Guillermo Acuna University of Fribourg
- 
30/10/2024
Interfacing colloidal nanoparticles with biological matter
Prof. Wolfgang Parak
 Fachbereich Physik, Universität Hamburg
- 
12/11/2024
Protein Libraries: Creation, Screening and Sorting
Liliana Teixeira CIC biomaGUNE
- 
27/11/2024
Mechanistic investigation of the seeded growth of chiral gold nanoparticles
Kyle Van Gordon CICbiomaGUNE
- 
10/12/2024
Carbohydrate-Decorated Antenna Dyes for Photo-Assisted Water Oxidation
Laura Confalonieri CIC biomaGUNE
- 
16/12/2024
Loss of the chromatin remodeler, ATRX, promotes aggressive features of osteosarcoma with increased NF-?? signaling and integrin binding
Dr. Suzanne Bartholf DeWitt Duke University
- 
17/12/2024
Christmas Lecture 2024 - Repurposing cell metabolism to assemble cell-free biofactories
Fernando López-Gallego
 CIC biomaGUNE

SCIENTIFIC CONFERENCES & WORKSHOPS

CIC biomaGUNE seeks to enhance its national and international visibility and reputation by organizing conferences, workshops and seminars that share knowledge about the latest research and advances in the field of biomaterials.

The following events were organized during 2024:

7th Glycobasque Meeting.

Chair: **Niels Reichardt**

(CIC biomaGUNE),

Bilbao, 7-8 November 2024

European South Atlantic Biophysics Congress.

Chair: **Aitziber L. Cortajarena**

(CIC biomaGUNE),

Donostia/San Sebastián, 5-7 June 2024

6th CIC biomaGUNE PhD Day.

Chair: **CIC biomaGUNE Research**

Associates, Donostia/San Sebastián,

10 October 2024

“AtheroConvergence” Closure Meeting.

Chair: **Jesús Ruiz-Cabello**

(CIC biomaGUNE),

Donostia/San Sebastián, 26 April 2024

IV Jornadas de Biocatálisis (IV JEBs).

Chair: **Fernando López Gallego**

(CIC biomaGUNE),

Donostia/San Sebastián,

5-6 September 2024

POTENTIAL Network Meeting.

Chair: **Sergio Moya**

(CIC biomaGUNE),

Donostia/San Sebastián,

18-19 April 2024

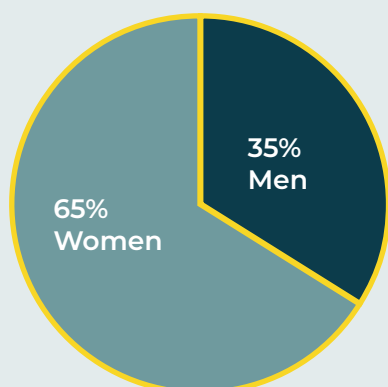


Additionally, our researchers have also chaired or co-chaired **8** other international conferences as listed below:

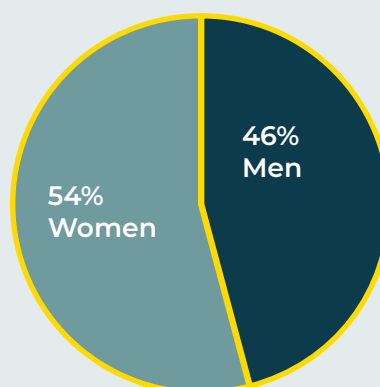
- ▲ **7th Iberian Carbohydrate Meeting.**
Co-chair: **Niels Reichardt**. Sitges, 15–17 January 2024.
- ▲ **2nd iNanophotonics Symposium 2024.**
Co-chair: **Luis M. Liz Marzán**.
Online, 25–26 May 2024.
- ▲ **European Winter School on Physical Organic Chemistry (E-WISPOC 24).**
Co-chair: **Maurizio Prato**.
Bressanone, Italy, 4–9 February 2024.
- ▲ **The Thinking Institute of the University of Vigo III.**
Chair: **Luis M. Liz Marzán**.
Vigo, Spain, 5–7 June 2024.
- ▲ **International Winter School on Electronic Properties of Novel Materials – Euroconference: Molecular Nanostructures.**
Co-chair: **Maurizio Prato**.
Kirchberg, Austria, 9–15 March 2024.
- ▲ **The Cutting-Edge Nanotechnologies for Good Health and Well-Being Conference.**
Chair: **Sergio Moya**.
Chulalongkorn University, Thailand, 9–12 July 2024.
- ▲ **ACS Spring National Meeting - Symposium “ACS Award in Surface Chemistry 2024” in honor of Hedi Mattoussi.**
Co-chair: **Luis M. Liz Marzán**.
New Orleans, USA, 17–21 March 2024.
- ▲ **International Materials Research Congress - Symposium “New Trends in Nanoscience and Nanotechnology: Innovative Synthesis, Novel Properties, Theory and Challenges”.**
Co-chair: **Luis M. Liz Marzán**.
Cancún, Mexico, 18–23 August 2024.

The participation of CIC biomaGUNE personnel to events is summarized below:

Attendance to conferences **268**



Oral & poster contributions **174**





DISSEMINATION & PUBLIC ENGAGEMENT

OUTREACH ACTIVITIES

In addition to our dissemination efforts within the scientific community, CIC biomaGUNE undertakes significant outreach initiatives aimed at the general public. These initiatives, either organized by us or in collaboration with third parties, are essential for making our research accessible and understandable to society. It is our responsibility to demonstrate the positive impact of our work on daily life. Consequently, we have strengthened our commitment to dissemination and outreach, particularly to promote STEAM careers among young girls and to increase the visibility of women in science. The detailed list of activities can be found at <https://www.cicbiomagune.es/outreach>.

During this period, **23 outreach activities** were organized, including open-doors/visits by high-school and university students. **Of these activities, 22** aimed to promote STEAM careers among young girls and improve visibility of women in science.



Emakumeak Zientzian

Since 2017, CIC biomaGUNE participates together with **32** Basque research Centers and Institutions in the **EMAKUMEAK ZIENTZIAN** event on the celebration on February 11 of the “International Day of Women and Girls in Science”. The sessions organized include: activities for 5th elementary grade students, colloquiums about past and present women scientists, an exhibition on women and science, practical workshops for retired women, seminars by women scientists on career development outside academia and YouTube videos on laboratory experiments.



Nanocientíficas en 60 Segundos

CIC biomaGUNE actively contributed to science outreach targeting young audiences through its participation in this initiative aimed at increasing the visibility of women in science. Several female researchers from the center took part in “Nanoscientists in 60 Seconds”, a video contest held as part of the 10alamos9 Nanoscience Festival, where high school students created short videos showcasing the work of women scientists in nanotechnology. In the 2024 edition, the video “El último combate”, focused on the work of Lourdes Marcano Prieto, postdoctoral researcher in the Biomolecular Nanotechnology group at CIC biomaGUNE, was awarded second place and received a special mention.



Biophyzza

To celebrate the Biophysics Week, the Spanish Biophysical Society coordinates a series of affiliate events locally organized by its members under the umbrella of the «Biophyzza Connection» and sponsored by Domino's Pizza. In Gipuzkoa, CIC biomaGUNE has taken the lead to organize this event since 2023.



Pint of Science

This initiative brings Science to local pubs, thereby breaking down the barriers that separate science from society.

CIC biomaGUNE researchers have taken an active part in the organization of the Pint of Science event in San Sebastián during 9 editions.



Inspira Steam

The **INSPIRA project** is a pioneering project in the Basque Country for the promotion of the scientific-technological vocation (STEAM: Science, Technology, Engineering, Arts and Maths) among girls. Several CIC biomaGUNE mentors accompany students during a period of two months with the following aims:

- Provide new references of nearby women technologists.
- For boys and girls to discover the STEAM professions.
- Raise awareness of the need for the development of the country to occur between men and women.
- Sensitize and guide on a career in technology.
- Make visible and value women technologists.



Encounter of Scientific Lives Inspira Bizitzak

CIC biomaGUNE participates in the “Encuentro de Vidas Científicas - Inspira Bizitzak” organized by Eureka! Zientzia Museoa located in the Gipuzkoa Science Park. This activity is directed to 4th elementary grade and bachelor students with the aim of boosting scientific vocations. The objective is to create a space where students can speak, ask questions and exchange opinions directly with various professionals from different scientific and technological fields.



“Donostia WeekINN” Innovation Week

CIC biomaGUNE participates since 2016 at the Innovation Week (Donostia WeekINN), an initiative of the San Sebastián city council with the following objectives:

- To raise awareness about the importance of innovation.
- To train and bring knowledge, share and learn.
- To recognize and make visible different organizations from the city that have an orientation towards Innovation.



Jakin-mina Programme

CIC biomaGUNE participates in the Jakin-Mina programme, an educational initiative organized by Jakiunde to promote knowledge and scientific curiosity among secondary school students in the Basque Country and Navarra. As part of this programme, CIC biomaGUNE contributes to raising awareness about sustainable technologies through a talk focused on protein engineering and biomolecule-based solutions to current global challenges.



BRTA Science and Innovation Roundtable

CIC biomaGUNE and CIC bioGUNE organized a roundtable on Science and Innovation ahead of the Basque parliamentary elections. The event brought together representatives from major political parties to present and discuss their proposals in this field. Held at the Science & Technology Park of Bizkaia, the session was open to researchers from across the BRTA alliance and aimed to promote dialogue between the scientific community and policymakers. This was the third edition of the initiative, first launched in 2012.



Science In The Classroom: CIC biomaGUNE Outreach Talk

CIC biomaGUNE participated in a STEAM outreach activity as part of the Erasmus+ programme, aimed at promoting interest in science and technology careers among high school students. On this occasion, Prof. Luis M. Liz Marzán, delivered a talk on nanotechnology applied to health at IES Cala de Mijas in Málaga. The session introduced students to cutting-edge research and highlighted how nanotechnology can contribute to solving major global challenges, while also supporting transversal learning across STEM subjects and improving students' communication skills in English.



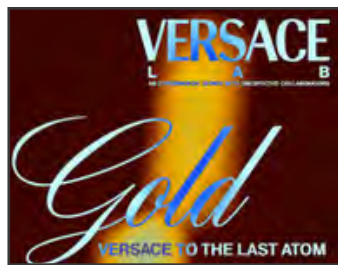
Understanding Healthy Weight Loss Through Biophysics - Public Conference

As part of the outreach activities linked to the ESAB2024 European South Atlantic Biophysics Congress, CIC biomaGUNE supported a public conference aimed at promoting scientific understanding of healthy weight loss through biophysics. The session, delivered by Prof. Félix M. Goñi, highlighted how science can provide accessible, evidence-based strategies for health without relying on costly or unrealistic solutions. Open to the general public, the event emphasized the role of biophysics in addressing everyday health challenges.



Guided Tours To CIC biomaGUNE's Imaging Platform

As part of the “Espacios de Innovación” initiative promoted by the Spanish Association of Science and Technology Parks (APTE), CIC biomaGUNE hosted guided tours of its Molecular and Functional Imaging Platform on November 7 and 8. The event offered professionals and the general public the opportunity to discover one of Europe's most advanced facilities in molecular and functional preclinical imaging. Recognized as a Singular Scientific and Technical Infrastructure (ICTS), the platform showcases cutting-edge technologies such as PET, SPECT, CT, MRI, and optical tomography, along with an AAALAC-accredited animal facility. These open days served to highlight the role of scientific infrastructure in biomedical innovation.



Collaboration With Versace

CIC biomaGUNE contributed to a unique science-art collaboration as part of a creative campaign by VERSACE, which explored hidden beauty through gold nanoparticles. The campaign featured electron microscopy images of nanoparticles synthesized in the laboratories of CIC biomaGUNE and its collaborators in partnership with the University of Vigo and the University of Antwerp. Highlighting the intersection between nanoscience and visual aesthetics, the initiative aimed to raise public awareness of the often-unseen beauty of scientific research.



CIC biomaGUNE Featured On Teknopolis

CIC biomaGUNE participated in a televised outreach activity through Teknopolis, a popular science programme broadcast on Basque public television (ETB). The episode, titled “At the Forefront of Advanced Therapies”, featured Ikerbasque Research Fellow Dorleta Jimenez de Aberasturi and researcher Paolo Di Gianvincenzo, who presented their work on non-viral vectors for advanced therapeutic applications. The programme, aired in both Basque and Spanish, highlighted CIC biomaGUNE's contribution to cutting-edge biomedical research and brought scientific developments closer to a broad audience.



Europa Press Science Forum

CIC biomaGUNE was represented at a scientific outreach event organized by Europa Press in Oviedo, titled “Robotics and Health: The Science of the Present”. Dr. Lourdes Marcano, Marie Curie Postdoctoral Fellow, participated as a speaker. The event brought together researchers, institutional representatives, and healthcare professionals to discuss the multidisciplinary nature of research and the transformative potential of robotics in medicine. The roundtable emphasized the importance of science communication, cross-sector collaboration, and STEM education in fostering public understanding and supporting the integration of emerging technologies in healthcare.



Native Scientists Programme

CIC biomaGUNE participated in the **Same Migrant Community Programme** organized by **Native Scientists**, held on December 16 in Pamplona. Liliana Teixeira, PhD student in the Biomolecular Nanotechnology group, engaged with children from migrant backgrounds, sharing her personal experience in science and research. The programme promotes cultural inclusion and empowerment by encouraging children to explore scientific topics in their heritage language, making science more accessible and relevant. This initiative reflects CIC biomaGUNE's dedication to inclusive and socially engaged science communication.



OPEN DAYS & VISITS

CIC biomaGUNE regularly receives visits from high-school and university students who come to have a closer look at our activity. These visits typically include a lecture about biomaterials in the context of life sciences, an open discussion with CIC biomaGUNE researchers and a guided tour to six technical facilities/laboratories (Nanoparticle Synthesis platform, Confocal Microscopy, Radiochemistry platform, Molecular and Functional Imaging Facility, Scanning Electron Microscopy, Atomic Force Microscopy). The programme of visits is run by **Javier Calvo with the support of Daniel Padró, Marco Möller, Desiré di Silvio, Irantzu Llarena, Judith Langer, Unai Cossío and Vanessa Gómez** along with the assistance of other Platform Managers, PhDs, Postdocs, and Group Leaders.



Undegraduate & Highschool visits

2016	7
2017	12
2018	9
2019	9
2020	4
2021	1
2022	12
2023	12
2024	10



MEDIA RELATIONS

In line with our philosophy of not only generating knowledge, but also disseminating it, we have increased our presence in general media exceeding 545 media hits in 2024.

Modality	2021	2022	2023	2024
Written Media	71	49	73	94
Online Media	209	33	281	310
Specialized Online Media	105	184	105	113
Expo		2		
Radio	15	10	9	17
TV	7	2	11	11
Total	407	280	479	545

WEB & PRESENCE ON SOCIAL MEDIA

With over 10,000 followers, our social networks and website focus on disseminating scientific content in an accessible way.



Modality	2021	2022	2023	2024
Web Visits	55,142	47,955	48,529	51,682
LinkedIn Followers	3,368	4,350	5,533	7,538
YouTube Followers			22	24
Instagram Followers			384	560
X Followers	2,726	3,139	3,769	4,004
Bluesky Followers				381

*Data reported refers to December of every year.



**SUSTAINABILITY,
COMPLIANCE &
SOLIDARITY**

CIC biomaGUNE Strategic Plan includes a commitment to 10 of the 17 **United Nations Sustainable Development Goals (SDGs)** and foresees the implementation of sustainability measures to ensure ethics, sustainability, transparency, compliance and respect for the environment.

STRATEGY

CIC biomaGUNE promotes sustainability actions to reduce the impact generated by our research activities. These actions are in line with the MSCA Green Charter and the UN's Sustainable Development Goals, and include:

- Reducing energy consumption across all facilities.
- Promoting environmental sustainability laboratory practices.
- Managing waste to minimize generation and explore recovery alternatives.
- Explore alternatives to reduce raw material consumption, or the use of materials with lower environmental impact.
- Prioritizing “green purchasing” of project-related materials promoting local or national sources.
- Implementing a sustainable mobility plan to reduce carbon footprint, including using low-emission forms of transport.
- Ensuring sustainable practices at project events by minimizing single-use materials and promoting low-emission travel or virtual meetings when appropriate.

In 2022, **CIC biomaGUNE created a sustainability committee** focused on enhancing environmental practices, including improving public transport options, promoting recycling, encouraging the repair and reuse of materials, and conducting thorough analyses of product and company compliance with green policies, such as the use of reusable containers.

Actions conducted thus far:



Single-use plastics analysis:

In 2024, CIC biomaGUNE agreed to take part in a pilot project led by [Merck](#) to study the amount and types of plastic produced in the laboratory and take part in a follow-up analysis program to identify possibilities to recycle single-use plastics (SUPs) and/or on-site processing.



Plastic caps recycling:

Since 2022, CIC biomaGUNE has participated in the [“Caps for a new life®”](#) project in collaboration with SEUR Foundation, involving the recycling of plastic caps to help children with serious health problems. This initiative not only aids in funding medical treatments but also contributes to a reduction in CO₂ by diverting plastic from landfills and promoting recycling.

Computers recycling:

In collaboration with IZT, CIC biomaGUNE participates in the Digilagun initiative by donating computers and other IT related hardware. The objectives of the Digilagun project are, on the one hand, to extend the life of computers in order to reduce the ecological footprint and, on the other hand, to contribute to reducing the growing digital divide in society. To this end, IZT ensures that sensitive information is erased from the computers and these are prepared for a new use. More information: [CIC biomaGUNE News](#).

Reusable ethanol bottles: Since 2023, CIC biomaGUNE has successfully integrated the use of reusable metallic ethanol bottles, thus totally eliminating SUPs from the ethanol supply chain.

Energy consumption reduction:

CIC biomaGUNE has implemented multiple actions to lower energy use, including optimizing lighting systems with energy-efficient LED installations, improving temperature regulation systems, and implementing automated controls to minimize energy waste during off-hours. These initiatives contribute to the center's commitment to sustainable energy practices and align with broader goals to reduce its overall environmental impact.

2024 Annual Energy Consumption:

- **Electricity: 2,520,764 Kwh**, which represents 401,283 Kwh less than in 2021. Equivalent to 100 tCO₂eq
- **Gas: 145.660 Kwh**, which represents 383,454 Kwh less than in 2021. Equivalent to 666 tCO₂eq

Green mobility:

CIC biomaGUNE has a mobility plan including actions aimed to promote sustainable commuting options and reduce the carbon footprint of its employees. Some actions include:

- **Car-pooling:** Together with the Science Park "Parke," CIC biomaGUNE promotes a car-sharing system. You can find more information on the car pooling [webpage](#).
- **Green mobility campaigns,** to promote sustainable commuting options, such as eco-friendly mobility such as biking, walking, car-pooling, or public transport. [More info](#).

Active participation in the Euskadi Technological Park Network's **Mobility and Sustainability Committee**. Through this platform, we share ideas, initiatives, and strategies to foster sustainable practices, thus contributing to regional environmental goals: [Parke verde y Parke Smart](#).

CONTRIBUTION TO SDGS

3 GOOD HEALTH
AND WELL-BEING

Research conducted at CIC biomaGUNE aims to develop innovative solutions that address health challenges. Investigation conducted at CIC biomaGUNE is aligned with the aims of Horizon Europe, the Spanish Science, Technology and Innovation Strategy, and the 2030 Basque Strategy for Science, Technology & Innovation, among others.

4 QUALITY
EDUCATION

- Work conducted at CIC biomaGUNE contributes to increasing the number of people who have relevant technical and vocational skills aimed at improving employment opportunities and entrepreneurship.
- Dissemination and outreach actions aimed at promoting STEAM areas among girls and women, including highlighting the figure of women in science, and thus contributing to the elimination of gender disparities in education to ensure equal access to all at all levels of education and vocational training.

5 GENDER
EQUALITY

CIC biomaGUNE conducts a triannual equality analysis and action plan with the aim of:

- Ensuring women's full and effective participation and equal opportunities for leadership at all levels of decision-making.
- Promoting initiatives that contribute to gender equity, leadership diversity, and an inclusive, discrimination-free environment.

8 DECENT WORK AND ECONOMIC GROWTH



- Scientific Research activities upgrade the technological capabilities of industrial sectors encouraging innovation and contribute to increasing the number of research and development workers as well as public and private research and development spending.
- Activities to promote technology transfer and entrepreneurship at CIC biomaGUNE contribute to creativity and innovation, and promotion of sustainable economic growth.
- Measures contemplated in our Equality Plan and in the Prevention protocol of, and action against, sexual or gender-based workplace harassment, contribute to:
 - Achieving a full and productive employment and fair work for all women and men, including equal pay for work of equal value.
 - Promoting a safe and secure work environment.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



Activities to promote technology transfer enhance scientific research and upgrade the technological capabilities of industrial sectors encouraging innovation and contribute to increasing the number of research and development workers as well as public and private research and development spending.

10 REDUCED INEQUALITIES



- Measures contemplated in our Equality Plan contribute to empower and promote the inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status.
- Subcontracting services to special employment centers promotes the social inclusion of all people, regardless of their conditions and circumstances.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION



Actions to promote selective waste collection will contribute, with a view to 2030, to a substantial reduction in the generation of waste by means of prevention, reduction, recycling, and reuse policies.

13 CLIMATE ACTION



Actions carried out in the responsible energy consumption have contributed to reducing the environmental impact (reduction of greenhouse gas emissions) of the Centre's activity and to improving the energy efficiency of the building.

16 PEACE, JUSTICE AND STRONG INSTITUTIONS



The Anti-Fraud Protocol, the Protocol for Dealing with Conflicts of Interest, and the Code of Ethics contribute to substantially reducing corruption and bribery that may occur in CIC biomaGUNE, with the goal to create an accountable and transparent institution at all levels.

More information about CIC biomaGUNE Compliance Policy and Code of Ethics: [Corporate compliance](#).

17 PARTNERSHIPS FOR THE GOALS

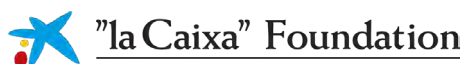


Our Research Program is conducted in collaboration with regional, national and international partners. We aim at fostering external cooperation and knowledge sharing by integrating our knowledge and research infrastructure within international consortia and networks.

ACCREDITATIONS



FUNDING



berrikuntza + ikerketa + osasuna eusko fundazioa
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2024

Activity Report

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