CINTECX

ANNUAL REPORT 2024

CINTECX
Universidade Vigo
XUNTA DE GALICIA
Cofinanciado por la Unión Europea
Fondos Europeos

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LETTER FROM THE DIRECTOR

CINTECX

LETTER FROM THE DIRECTOR

M.ª Ángeles Sanromán Braga

DIRECTOR OF CINTECX

The year 2024 has been especially significant for CINTECX, representing a pivotal moment in our development. Our recognition by the Xunta de Galicia as a Collaborative CIGUS Centre stands out as a major milestone, highlighting our collective effort and unwavering commitment to excellence, technology transfer, and social impact.

In this context of growth and evolution, a change in the leadership of the centre took place at the end of May. Concepción Paz Penín concluded a highly dynamic period, laying a solid foundation that has made it possible to continue advancing towards the achievement of our strategic objectives. Since then, I have assumed the responsibility of leading this new stage, focusing on strengthening CINTECX's positioning at both national and international levels, and on the development of our strategic areas.

Throughout the year, key performance indicators have reflected a collective commitment to excellence. We have participated in 54 research projects in strategic fields such as energy, sustainability, and advanced industrial processes. At present, we are developing 8 international projects, including two of particular relevance within the Horizon Europe programme. Moreover, we have led the attraction of resources both at the regional level, securing over one million euros in excellence grants of the Universidade de Vigo, and nationally through the Knowledge Generation Projects call.

In the area of technology transfer, CINTECX has further strengthened its role as a key partner to the industrial sector, signing over 90 new contracts with companies. Additionally, we have collaborated on the development of innovative prototypes tailored to real industry needs, which were showcased at events such as Navalia, enhancing our visibility and expanding our collaborative networks across the sector.

The year 2024 concluded with over 154 publications indexed in the Journal Citation Reports (JCR), of which 98 belong to the first quartile (Q1) and 60 to the top decile (D1). This volume and quality of scientific output consolidate our

position as a leading reference in knowledge generation in strategic areas. The defence of 18 doctoral theses, 11 of them with international distinction, and the incorporation of new research talent reflect our ongoing commitment to training and the development of excellent scientific careers.

Our active participation in outreach initiatives such as open days, *Pint of Science*, and *G-Night* has enabled us to bring science closer to diverse audiences, promoting dialogue between research and society, and inspiring future generations to pursue careers in technology and science.

A particularly relevant achievement this year has been our progress in promoting gender equality. This effort has materialised through several initiatives, including the publication of the *Operational Guide for Incorporating a Gender Perspective in Technological-Industrial Research* and various outreach events. These actions have been recognised with the Equality Distinction awarded by the Universidade de Vigo, highlighting CINTECX as a pioneer in the integration of equality policies within the fields of science and technology.

These achievements would not have been possible without the dedication and talent of everyone who is part of CINTECX. My most sincere gratitude goes to our team, whose daily commitment makes it possible for us to consolidate our position as a leader in research and knowledge transfer.

Looking ahead, we are determined to continue advancing along the path of excellence, strengthening our capacity for impact and addressing the strategic challenges outlined in our 2024–2027 plan. We deeply appreciate the support of the Universidade de Vigo, the Xunta de Galicia, and all the collaborating entities that make our work possible.

With this document, we present the milestones achieved in 2024, which reflect our collective commitment and shared vision to contribute to the technological-industrial development of Galicia from an innovative, sustainable, and inclusive perspective.

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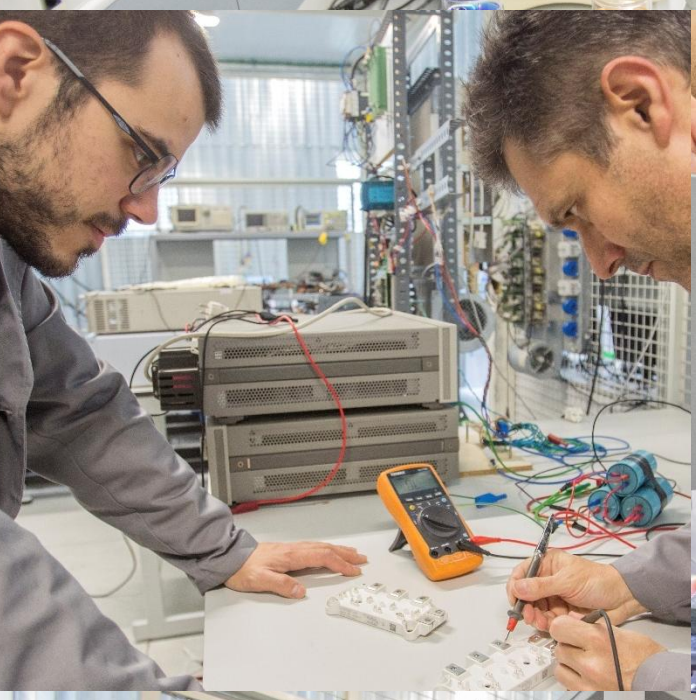
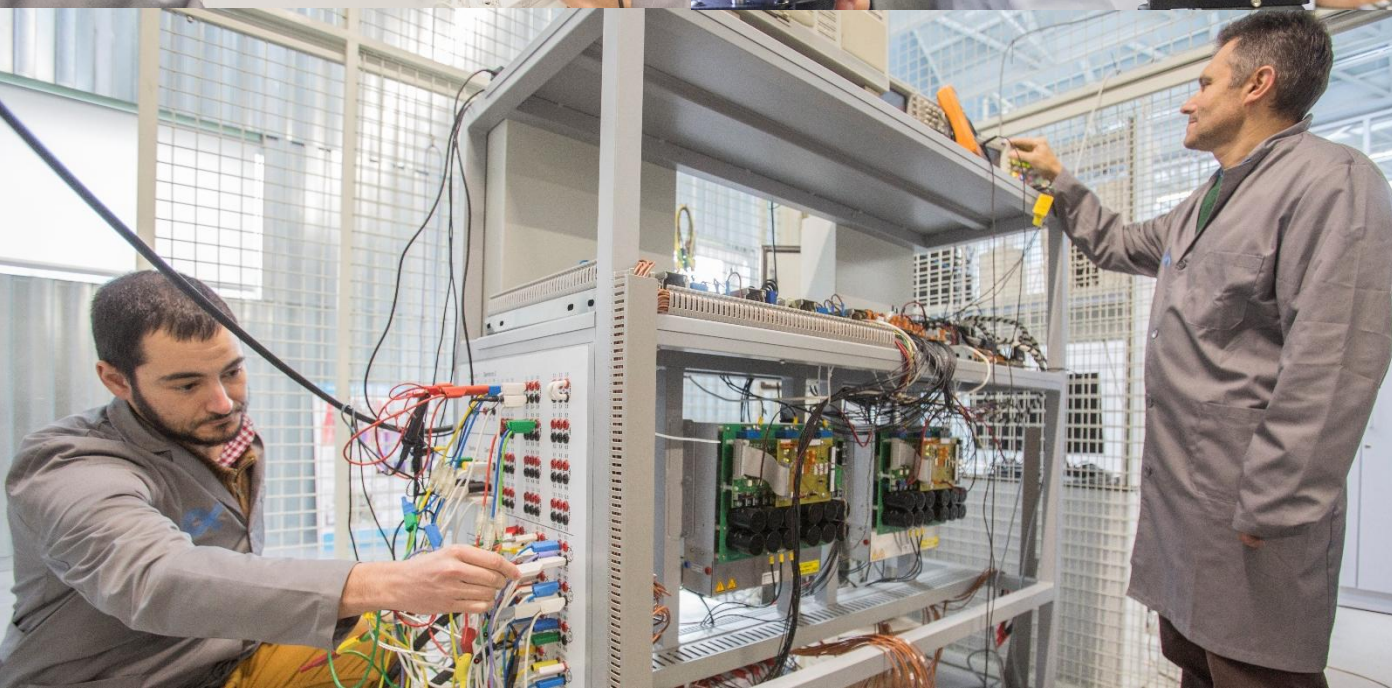
INTRODUCTION

CINTECX





INTRODUCTION

The Research Centre in Technologies, Energy and Industrial Processes (CINTECX) of the University of Vigo has positioned itself as a reference in the generation of knowledge and the transfer of innovative solutions to the productive sector. Through a multidisciplinary approach, CINTECX combines basic and applied research to address technological challenges and promote scientific excellence with a high level of competitiveness.

CINTECX has been recognised as a Collaborative Centre within the network of Research Centres of the Galician University System (CIGUS) for the 2024–2027 period, by virtue of the resolution issued on 30 April by the Regional Ministry of Education, Science, Universities, and Vocational Training of the Xunta de Galicia, which establishes the grants for the structure, improvement, and support of the research centres within the Galician university system.

CINTECX is housed in a distinctive building located on the Lagoas-Marcosende University Campus in Vigo, a space that this year was included in the *Turismo Rías Baixas* project promoted by the Provincial Council of Pontevedra, which highlighted the university as an example of contemporary architecture and innovative urban planning (Figure 1). This building serves as a distinctive feature that reinforces the centre's image within its surroundings. It is an icon symbolising innovation and modernity, strengthening the centre's identity as a reference institution in the fields of research and technology transfer. Moreover, these dedicated facilities promote internal interaction and collaboration, providing meeting rooms, training spaces, and shared laboratories equipped with the centre's own resources.

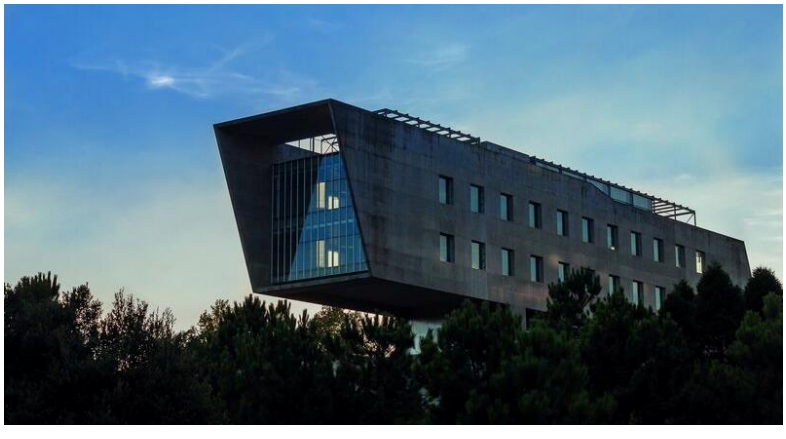


Figure 1. General view of the CINTECX building at the As Lagoas-Marcosende University Campus.

Mission, vision and values

The mission of the centre is to generate and disseminate excellent knowledge and to transfer innovation in the fields of energy, technologies, and industrial processes, with a focus on people and sustainable development.

CINTECX's vision is to establish itself as a leading centre in the technological-industrial field through research excellence, producing a tangible impact on its environment and on its technological and industrial partners, while generating a critical mass in research.

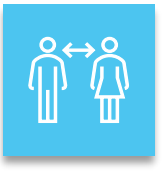
Values

Sustainability; at all levels, both in the development of its activities and through the technological solutions it generates.

Trust; through the establishment of long-term relationships, with the aim of contributing to the enhancement of the competitiveness of the surrounding innovation ecosystem.

Efficiency; in management and in all aspects of the centre's activities.

Excellence; in the achievement of research outcomes and their impact.



Equality; ensuring effective equality between men and women in the development of research activities.

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CINTECX IN NUMBERS


Centro de Investigación Tecnolóxico Industrial
CINTECX

CINTECX IN NUMBERS

			203 TEAM
		33% FEMALE	67% MALE
	40 PREDOCTORAL RESEARCHERS	21 POSDOCTORAL RESEARCHERS	18 THESES
206 PUBLICATIONS	154 JCR PUBLICATIONS	64% Q1 PUBLICATIONS	39% D1 PUBLICATIONS
4,7 M€ FUNDING OBTAINED	54 ACTIVE RESEARCH PROJECTS	8 INTERNATIONAL PROJECTS	92 CONTRACTS WITH COMPANIES	37 ACTIVE PATENTS


CINTECX
Centro de Investigación en Tecnologías, Energía y Procesos Industriales

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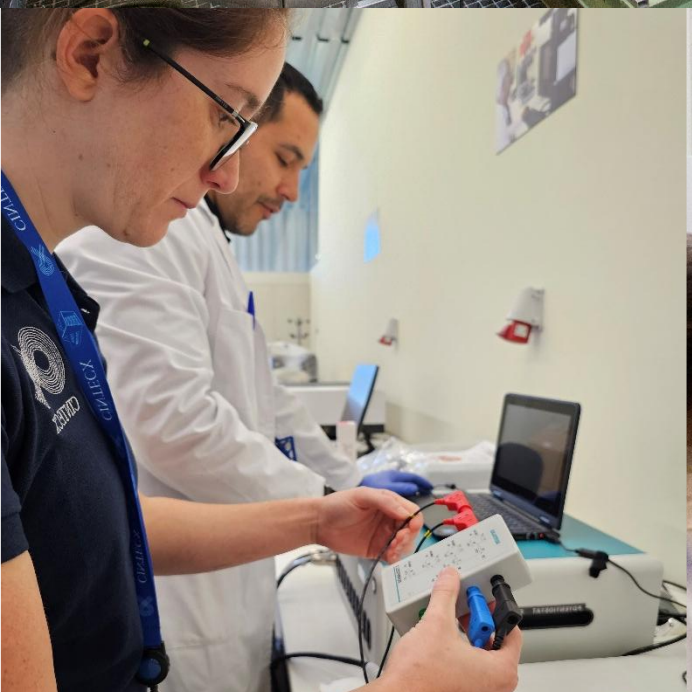
THE CENTRE

CINTECX



THE CENTRE

CINTECX has a clear organizational structure, centred around the role of the Scientific Director and guided by principles of good governance and the pursuit of scientific excellence. The centre has a proven research track record, demonstrated capacity for personnel training, and successful acquisition of funding through competitive calls. Notably, its collaborations with the industrial sector stand out, in the form of consortia for competitive calls as well as direct partnerships under Article 60 of the Science Law.

Governance

The governance structure of CINTECX follows the functional organization established in the regulations for research groups, associations, and centres at the University of Vigo. The Scientific Directorate leads the centre's governance. Activities are overseen by the Governing Committee of Research Centres at the University of Vigo, with advisory support from the Scientific Advisory Board (SAB), composed of esteemed academics and professionals who provide a strategic and objective perspective of the centre to both the Governing Committee and the Directorate (Figure 2).

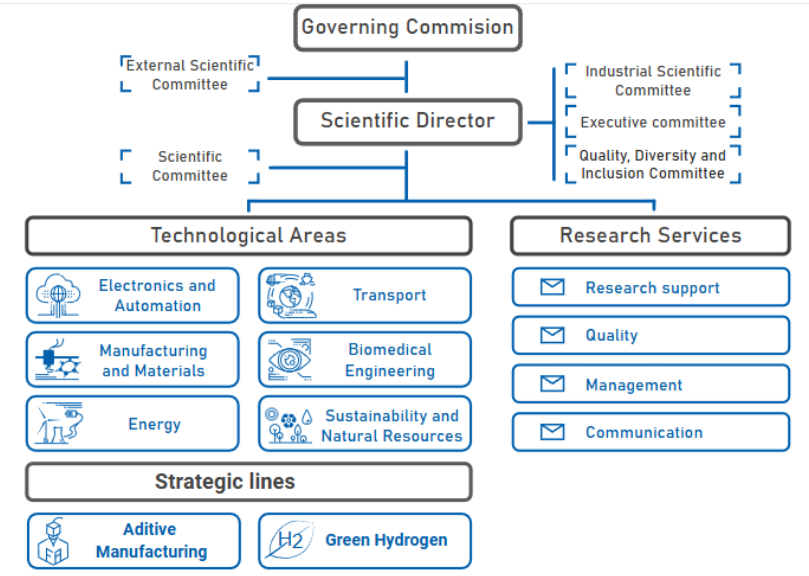


Figure 2. CINTECX Organizational Chart.

The Scientific Directorate coordinates the six Technology Areas and Research Services shown in Figure 2, supported by the following four committees:

Industrial advisory board

The Industrial Advisory Committee is composed of professionals from companies and governmental bodies with technological leadership. Its functions include guiding the centre in technology transfer, training, and outreach activities to the industrial sector, as well as identifying common interests to promote public-private collaboration. This committee holds annual meetings with the Centre's Directorate (Figure 3).

David Robledo Saenz

Director of Innovation at the Coren Group

Jose Luis Blanco Diéguez

CEO Nordex

Patricia Moreira Cortés

President of the Galician Automotive and Mobility Cluster

Sabela Pardo Rodríguez

Director of the Strategy and Programs of Agencia Gallega de Innovación (GAIN)

Enrique Mallón Otero

General Secretary ASIME

Cristina Isabel Martínez Castañeda

Director of Cybersecurity and Facilities at Stellantis

Figure 3. Members of the Industrial Advisory Borad (IAB)

Equality, diversity, and inclusion committee

The Equality, Diversity, and Inclusion Committee is responsible for the development, monitoring, and proposal of CINTECX's policies related to its functions. This committee includes a representative from the Equality Office of the University of Vigo (Figure 4).

M.ª Ángeles Sanromán Braga
Full Professor
Director of CINTECX

M.ª Concepción Paz Penín
Full Professor
Researcher of CINTECX

M.ª Carmen Pérez Pérez
Full Professor
Researcher of CINTECX

M.ª Teresa Rivas Brea
Associate Professor
Researcher of CINTECX

Emilio Rosales Villanueva
Associate Professor
Researcher of CINTECX

Águeda Gómez Suárez
Director of the Equality Unit, University of Vigo

Eduardo Suárez Porto
Associate Professor
Researcher of CINTECX

Mariola Norte Navarro
Communications Manager of CINTECX

Alba Giráldez Rodríguez
Project Manager at CINTECX

Figure 4. Members of the CINTECX Equality, Diversity, and Inclusion Board in 2024

Executive and scientific committees

The Executive Committee, composed of the Director and Deputy Director of the centre, collaborates on management, promotion, and outreach tasks, among other strategic functions.

The Scientific Committee consists of the coordinators of each research group within the centre and serves as an advisory body on matters related to research and technology transfer (Figure 5).

M.ª Ángeles Sanromán Braga
Director

Félix Quintero Martínez
Deputy Director

Juan M.ª Pou Saracho
Industrial Laser Applications Group

Jesús Doval Gandoy
Applied Power Electronics Technology Group

Ángel Fernández Vilán
CIMA Group

Enrique Casarejos Ruiz
Numerical Design and Simulation in Mechanical Engineering Group

Xosé Ramón Nóvoa Rodríguez
Corrosion and Materials Engineering Group

José Manuel Cruz Freire
Chemical Engineering 10 Group

Javier Taboada Castro
Safe and Sustainable Management of Mineral Resources Group

José Luis Míguez Tabarés
Energy Technology Group

Marta M.ª Pazos Currás
Bioengineering and Sustainable Processes Group

Pío M. González Fernández
New Materials Group

Henrique R. Lorenzo Cimadevilla
Applied Geotechnologies Group

Figure 5. Members of the CINTECX Scientific Committee.

Scientific advisory board

Manuel Andrés Rodrigo Rodrigo

Graduated with honours in Industrial Chemistry from the University of Valencia in 1993. Earned a PhD in Chemical Engineering in 1997. In 1999, completed postdoctoral research in Switzerland, focusing on high-temperature fuel cells. Since 2009, he has led a research team in electrochemistry, energy, and the environment. Serves on the editorial boards of three WoS-indexed journals. In 2020, he received the Career Achievement Award from the Chemical Engineering Group of the Royal Spanish Chemical Society.

Carlos Luís Molpeceres Álvarez

In 1991, he served in the Spanish Army in the optics laboratory of the Navy's research and development centre. He completed research stays at foreign institutions in France and Germany. In 1993, he worked as a researcher at CIEMAT focusing on optical techniques. From 1998 to 2011, he was Director of the UPM Laser Centre, which he currently directs. His research activity focuses on the development of new micro- and nano-laser processing techniques in the fields of energy, biotechnology, and oncology.

Leopoldo García Franquelo

Graduated in Electrical Engineering in 1977 from the University of Seville, where he earned his PhD in 1980. Full Professor since 1986. Served as Head of the Department of Electronic Engineering from 1998 to 2005. He leads a research team awarded by the Andalusian Government. He received the Andalusian R&D Award in 2009. Distinguished Professor since 2006 in the Industrial Electronics Society. Senior AdCom Member since 2008.

Salvador Ivorra Chorro

PhD in Mechanical Industrial Engineering. Vice-Rector for Infrastructure, Sustainability, and Occupational Safety at the University of Alicante. Associate Professor of Continuum Mechanics and Structural Theory in the Department of Civil Engineering at the University of Alicante. Coordinator of the GRESMES research group. Research focus on the dynamic behaviour of structures and structural reinforcement. Former Director of Civil Engineering at the University of Alicante and Coordinator of the Civil Engineering area at the State Research Agency.

María del Pilar Dorado Pérez

PhD in Agricultural Engineering from the University of Córdoba. Appointed Full Professor in 2012. Served as Vice-Rector of the University of Córdoba from 2010 to 2012. She has led the BIOSHAE research group since 2002. Her research focuses on the application of process engineering to renewable alternative fuels and energy efficiency, particularly in biorefinery technologies and second-generation biofuels. She was awarded the Gold Medal for Professional Merit with Red Distinction in 2018.

Alba Diéguez Alonso

PhD in Engineering from Faculty III of Process Sciences at the Technical University of Berlin. She was a junior professor at the Institute of Fluid Dynamics and Thermodynamics at Otto von Guericke University Magdeburg, where her research focused on the thermochemical conversion of biomass and plastics. In her current role at Technische Universität Dortmund, she continues to excel in the development and optimization of thermochemical and thermocatalytic conversion processes. Her work not only addresses current challenges in natural resource conversion but also drives innovation toward a more sustainable future.

Rui L. Reis

PhD in Chemical Engineering from the University of Porto in 1994. Vice-Rector of the University of Porto since 2009. His research focuses on tissue engineering and regenerative medicine. He is the founder and director of the 3B's Research Group on Biomaterials, Biodegradables, and Biomimetics. Editor-in-Chief of the journal *Materials Science and Engineering*. He was awarded the honorary degree of Doctor Honoris Causa by the University of Mons, Belgium.

Thematic areas

CINTECX maintains its efforts focused on six technological areas aligned with the Sustainable Development Goals, aiming to promote sustainability and advance the most innovative technologies. These areas are the following:

ELECTRONICS AND AUTOMATION

- Artificial intelligence and robotics.
- Sensors.
- Optoelectronics and micro/nanoelectronics.
- Power electronics.
- Flexible and efficient power management systems.

MANUFACTURING AND MATERIALS

- Additive Manufacturing.
- Advanced manufacturing and materials processing methods.
- Reducing material consumption and recycling.
- Advanced materials.
- Simulation of manufacturing processes and advanced materials.

ENERGY

- Renewable energy.
- Energy efficiency in buildings and industry.
- Energy storage.
- New fuels.
- Batteries.
- Grids.

TRANSPORT

- Propulsion and emissions.
- Electric vehicles.
- Fuel-saving systems.
- Vehicle dynamics.
- Accessible, safe, and sustainable transportation.
- Smart mobility and road safety.

BIOMEDICAL ENGINEERING

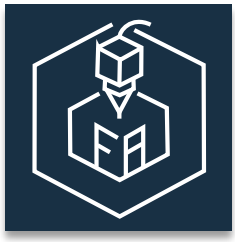
- Biomaterials.
- Biosensors.
- Biofluids.
- Implants and tissue engineering.
- Tools, technologies, and digital solutions for health and care.

SUSTAINABILITY AND NATURAL RESOURCES

- Soil and water sustainability.
- CO2 capture.
- Circular industry.
- Geoengineering, environmental engineering, and resilience.
- Heritage conservation.

Strategic lines

CINTECX focuses its research on two key strategic lines, defined by their high technological and industrial impact. These lines are designed to explore and investigate cutting-edge technologies, thereby promoting innovation in both the scientific and industrial sectors. This strategic orientation enables the centre to lead significant projects and contribute to the development of knowledge and technology, strengthening its role as a reference point in research and technology transfer. These strategic lines are the following:



ADDITIVE MANUFACTURING

- Materials characterization.
- Post-processing techniques.
- Corrosion resistance evaluation, pitting analysis.
- Development of new filaments and recycling capacity.
- Advances in laser-assisted additive manufacturing processes.

GREEN HYDROGEN

- Development of sustainable catalysts.
- Preparation of catalytic electrodes using advanced techniques.
- Quantitative and qualitative evaluation of the hydrogen generated to ensure applicability.
- Applications in propulsion systems for transportation, especially maritime transport.

History

The Centre was established in July 2019 by agreement of the Governing Council of the University of Vigo, ratified by the University Senate. Its strategic objectives for the initial years were outlined in the 2020-2023 Strategic Plan. CINTECX was created as an instrument to implement the competitiveness agenda of the University of Vigo, building upon the foundation of the INEX strategic grouping. Figure 6 illustrates in a clear and structured way the progress achieved and the key milestones that have defined the centre's track record towards excellence and its consolidation as a reference point in research and technology transfer.

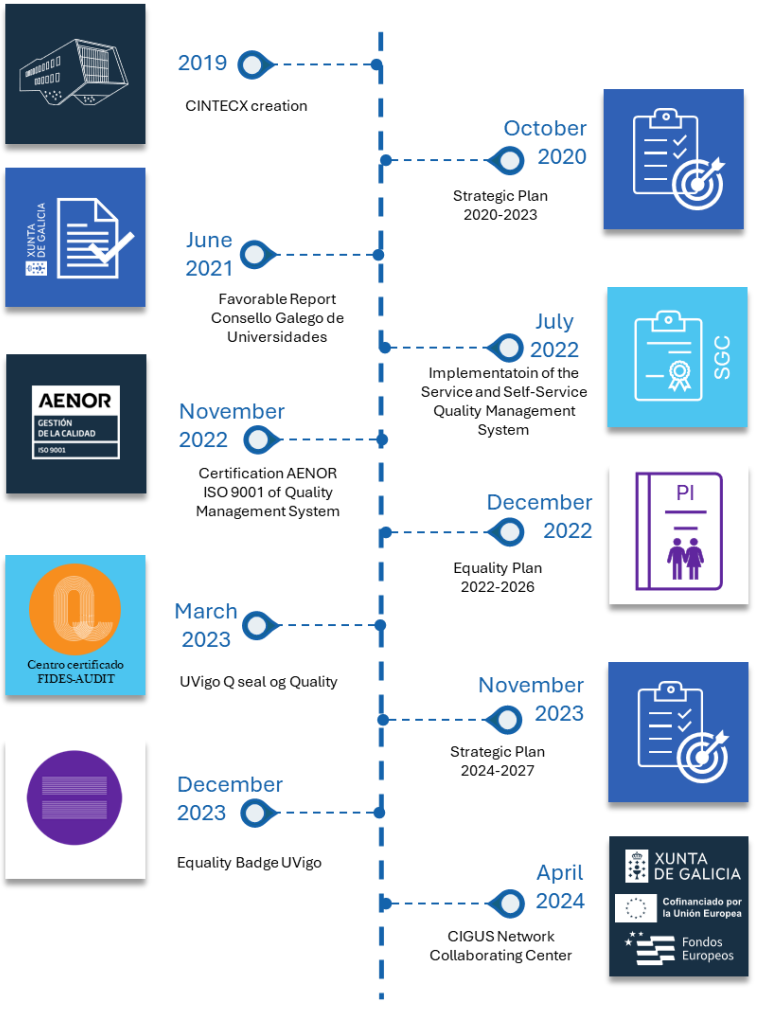


Figure 6. Timeline of the most notable milestones and advances of CINTECX.

A key highlight is the attainment of the recognition as a collaborative centre, marking the latest milestone in CINTECX's path towards excellence within the network of the Galician University System. Figure 7 displays the plaque awarded to CINTECX in recognition of its track record.

Figure 7. Plaque awarded to CINTECX in recognition of its track record.

Throughout 2024, CINTECX has carried out a series of activities aligned with the objectives set out in its 2024–2027 Strategic Plan and with the application for funding for the structure, improvement, and support of research centres within the Galician University System, potentially co-financed under the Feder Galicia 2021–2027 Operational Programme.

These activities have enabled CINTECX to:

- Expand its national and international impact in the fields of research and technology transfer.
- Improve communication with diverse audiences, promoting inclusion and access to scientific knowledge.
- Consolidate its role as a strategic partner within the Galician innovation ecosystem, strengthening relationships with industry and public administrations.
- Position itself as a leading reference in innovation and sustainability, in line with the objectives of its Strategic Plan.

The actions carried out with the support granted by the Xunta de Galicia and Feder Funds have been essential in consolidating CINTECX as a leading centre in the technological-industrial field, with a tangible and significant impact on society. These achievements reflect the centre's commitment to scientific excellence, knowledge transfer, and the strengthening of its social impact, establishing itself as a key player in the technological and industrial development of Galicia.

Team

CINTECX has maintained strong stability within its critical mass of research personnel, ensuring the continuity of its strategic research lines. This stability is essential for sustaining the centre's high level of scientific output, strengthening internal synergies, and consolidating a sense of belonging — all of which are key elements in securing its prominent position at both national and international levels (Figure 8).

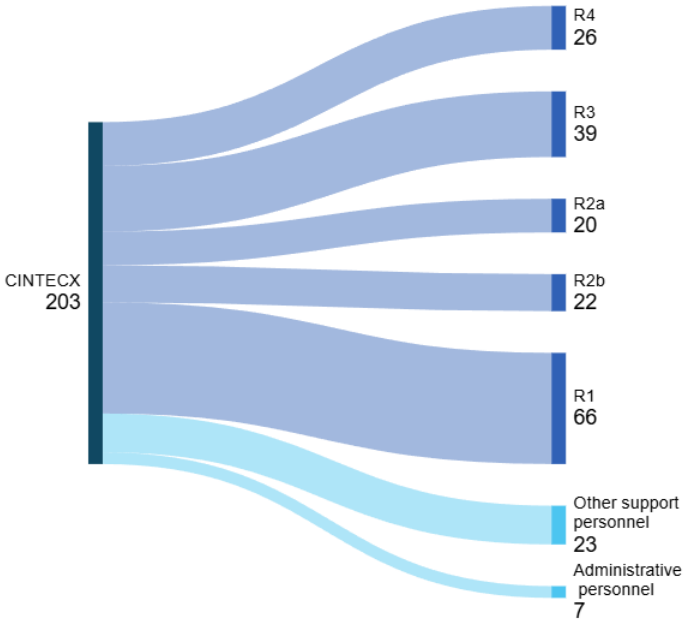


Figure 8. List of Researcher categories at CINTECX.

As a centre belonging to the University of Vigo, which was awarded the HR Excellence in Research accreditation by the European Commission in 2017, CINTECX adheres to the European Union's recommendations regarding talent recruitment and retention. Through open and transparent processes, it ensures the growth and continuity of its research staff, in alignment with international best practices.

In terms of diversity, the current staff is composed of 67% men and 33% women, reflecting progress toward greater balance in the technological-industrial sector (Figure 9). This commitment to equity is also evident in talent promotion

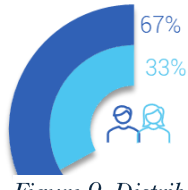


Figure 9. Distribution of CINTECX staff by gender.

(Figure 10) and among the principal investigators (PIs) of national and international projects (Figure 11).

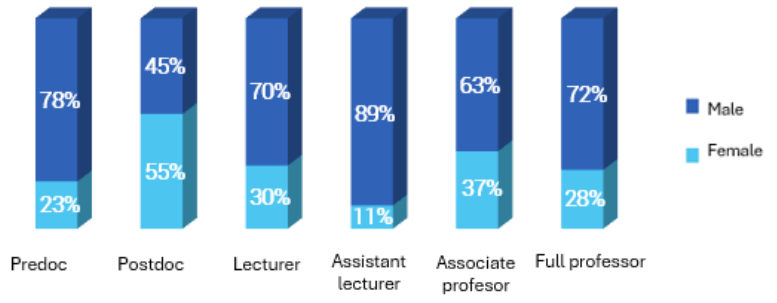


Figure 10. Distribution of the Centre's staff in 2024 by category and gender.

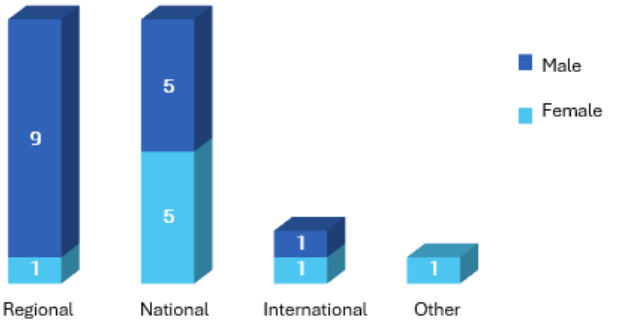


Figure 11. Distribution of the principal investigators of the projects secured in 2024 by gender.

It is also important to highlight that, regarding staff evolution, there has been a significant increase in the number of full professors at the centre. Since 2022, the number of female full professors has risen from 4 to 7 in 2024, while the number of male full professors increased from 12 to 18 during the same period. This growth not only reflects the strengthening of CINTECX's research team but also the recognition of the experience and excellence of its personnel.

Building

CINTECX has its own building, specifically designed to house its laboratories and offices, with more than 2,000 square meters of usable space distributed over a modern two-story building and a workshop area on the -1 floor (Figure 12). In addition, the centre features a rooftop that includes a technical room, an ultrapure gas central, and a waste storage area. Strategically located on the Campus of the Universidade de Vigo, it was designed to carry out excellent research and promote technology transfer.

The building is equipped with heating through a geothermal heat pump and underfloor heating, and air conditioning via aerothermal technology. Moreover, it has a photovoltaic installation on the roof and the west facade, providing CINTECX with a closed, efficient, and low-emission system aligned with the sustainable development goals and the Do No Significant Harm (DNSH) policy.

These facilities ensure a safe and efficient working environment, essential for the development of advanced research.

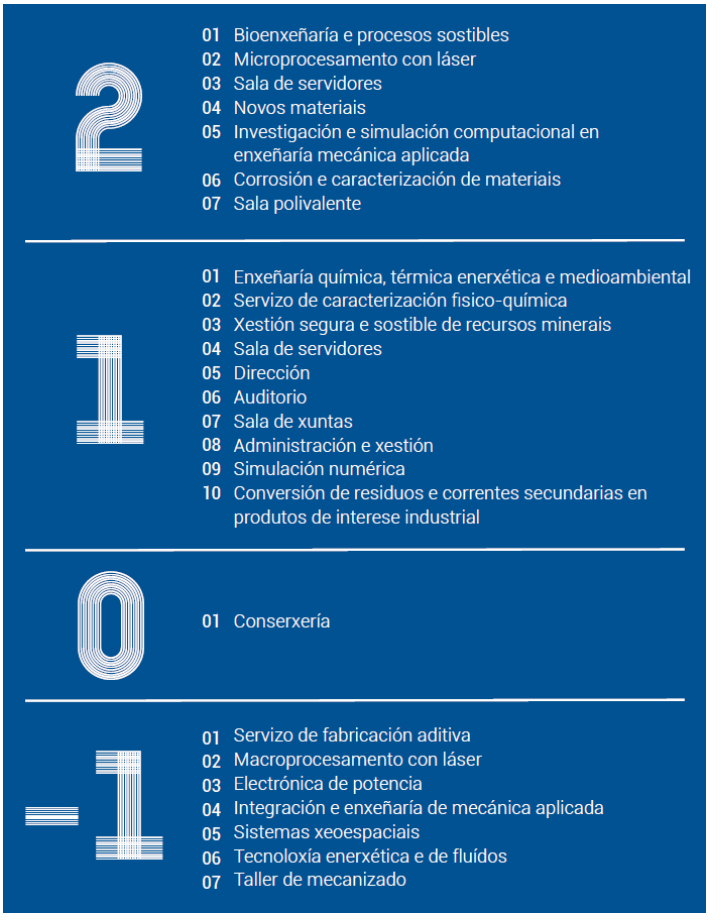


Figure 12. Image of the plaque of the structure of each floor of the centre.

Structure

Floor -1:

The -1 floor, also known as the workshop area, is equipped with five laboratories and specialized zones. Additionally, to support all research staff, it includes a machining workshop with advanced tools and equipment, and an additive manufacturing workshop housing machines dedicated to 3D printing technologies such as Fused Filament Fabrication (FFF), Selective Laser Sintering (SLS), Stereolithography (SLA), along with auxiliary equipment for pre- and post-processing. This space features a climate control and humidity regulation system, ensuring optimal conditions necessary for manufacturing and prototyping processes, thereby guaranteeing the highest quality in the technological developments carried out.

Floor 1:

The first floor of the CINTECX building houses three laboratories, the offices of the Directorate and Administration, and two coworking spaces: the Auditorium and the Meeting Room. The latter has been recently equipped with an 85-inch monitor on a mobile stand, as well as an additional 65-inch screen and a videoconferencing system. This allows the centre's staff to reserve the room for various activities, such as meetings, talks, or events (Figure 13).

Figure 13. Meeting Room.

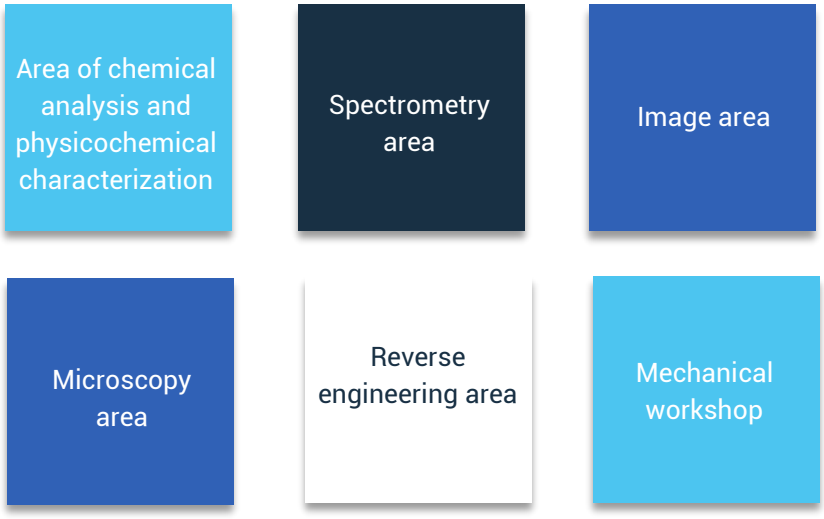
Among the laboratories, Laboratory 1.02 stands out, specialized in physicochemical characterization. It is equipped with a wide range of common-use instruments available to the centre's staff, the broader research community, and external clients such as companies and technology centres from outside the University of Vigo, under service and self-service modes. During 2024, the equipment offering was expanded with the acquisition of new devices following the Infrastructure Roadmap, thereby strengthening the technical capabilities of the centre.

Floor 2:

On the second floor of CINTECX, there are five laboratories where the centre's researchers carry out their projects. Moreover, there is a multipurpose room, a space intended for rest, socialization, and recreational and wellness activities, designed to promote interaction among users.

Services

CINTECX has a portfolio of analysis services available to users from the University of Vigo, other public research centres, private entities, and companies. Furthermore, the centre holds a Quality Management System certified by AENOR according to the requirements of the ISO 9001:2015 Standard. This system ensures a high level of quality in service delivery, especially in the industrial sector, strengthening user confidence. The following are the areas in which services are provided:



AENOR
GESTIÓN DE LA CALIDAD
ISO 9001

For another year, CINTECX has demonstrated its commitment to quality by renewing its ISO 9001:2015 certification for its Quality Management System.

Analytical services are provided in two modalities: self-service and support staff. The laboratory received a laboratory technician in February 2024 and will be strengthened in January 2025 with the addition of a new technical profile to the laboratory, which will improve management and resource availability. In addition, the centre is processing a request for an additional technician through the State Research Agency's call for proposals, with the aim of further strengthening the technical support necessary for its activities.

During 2024, the centre acquired new equipment thanks to Feder funds and the Xunta de Galicia's Scientific Equipment call. These have been made available as service resources to users in the physico-chemical characterization and additive manufacturing laboratories, with full incorporation expected by 2025. A total of eight new devices were acquired:

- Shimadzu UV-3600i Plus high-performance UV-VIS/NIR spectrophotometer with three detectors covering a wide scan range from ultraviolet (185 nm) to infrared (3–300 nm).
- PGSTAT302N Potentiostat/Galvanostat: equipment for electrochemical characterization of materials.
- LITESIZER 500: a light scattering instrument to characterize particles in liquid dispersions, allowing measurement of particle size, zeta potential, electrophoretic mobility, molecular weight, and transmittance.
- Additive manufacturing equipment: highlights include a Tronxy Moore X4060 clay extrusion printer, a Nexa3D-XIP masked resin stereolithography printer with Raise3D DF Cure curing station. Complementing the existing FFF printer, a 3DEVO GP20 plastic shredder and a 3DEVO Filament Maker TWO extruder for recycling and creating custom filaments were acquired.

This new equipment enables CINTECX to offer a broader and more differentiated portfolio of services, increasing its appeal as a strategic partner for research and technological development.

Equipment

CINTECX's capabilities to collaborate with the industrial and academic sectors are supported by top-tier scientific equipment, establishing it as a national and international leading reference in innovation and technology.

CINTECX's distinctive equipment includes the following:

- Combustion engines and particle generation systems.
- Biomass boilers and cooling systems.
- Climatic chambers for simulating extreme conditions.
- Laser equipment for material processing.
- Test benches for power electronics and photoelectrochemical processes.
- Additive manufacturing and pyrolysis equipment.
- Boiling systems, automation devices, and thermographic cameras.

In addition, CINTECX has an extensive range of advanced technology across various disciplines:

- Comprehensive motion capture system (MoCap).
- Bertec FP4060-07-2000 force platform.
- Noraxon Ultium surface electromyography (EMG) system.
- Pilot plant for electroadsorption.
- Multiphase electric machines and test benches.
- Power electronic converters and control platforms.
- Laboratory equipment and software/HIL tools.
- Additive manufacturing system with LDED technology.
- Workstations with pulsed lasers and blue laser.
- Mobile 3D laser scanners: Lynx Mobile Mapper (Optec), Riegl VUX-1HA, Zeb Go.
- Terrestrial 3D laser scanners: Faro Focus 3D X330, Riegl LMS-Z390i, Velodyne VLP-16.
- Photogrammetric cameras: Rollei Flex 6006, Nikon D100 (20mm, 50mm lenses), Canon DC10 (20mm lens).
- Ground-penetrating radar: RAMAC system with antennas of 25, 50, 100, 200, 500, 1000, and 2500 MHz.
- AR/VR devices: Microsoft HoloLens 2, Apple iPadPro 2021, HP Reverb G2.

Besides the specific laboratory equipment and research support services, CINTECX centrally manages annual investments in shared scientific infrastructures to strengthen its strategic technology areas. A dedicated working group identifies common equipment needs aligned with the scientific agenda, assessing current and future demands, and setting priorities in an Infrastructure Roadmap.

Prioritization for new acquisitions is based on criteria such as the number of internal users who would benefit, the number of projects or research lines served, maintenance costs, and the need for additional infrastructure or specialized technical staff. Currently, the centre manages over 20 unique infrastructures and equipment, with some of the most relevant highlighted above.

Data Processing Centre (CPD)

Clean Room

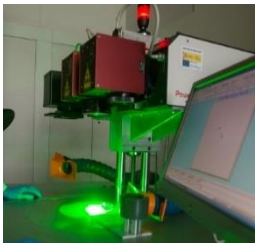
Concrete Additive Manufacturing Station

Additive manufacturing system using LDED technology

Pilot fermentation plant

Subsurface ground-penetrating radar (GPR)

Laser processing station

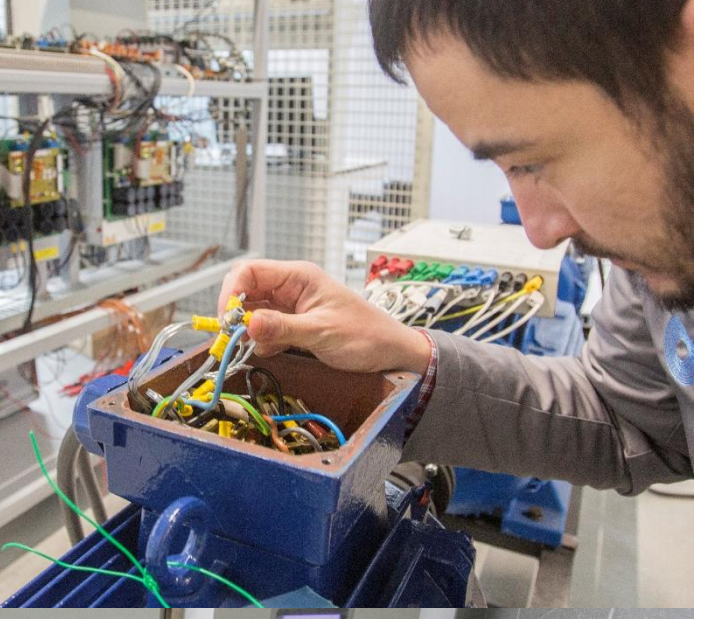


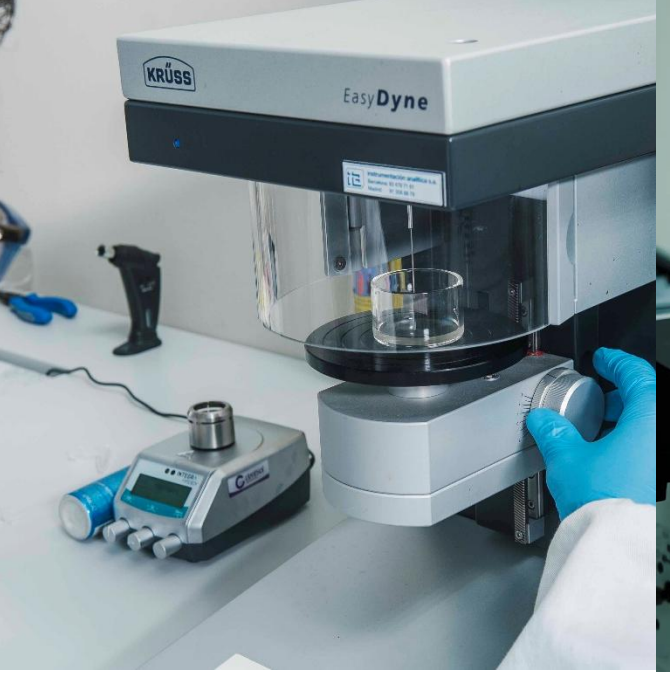
Engine test bench

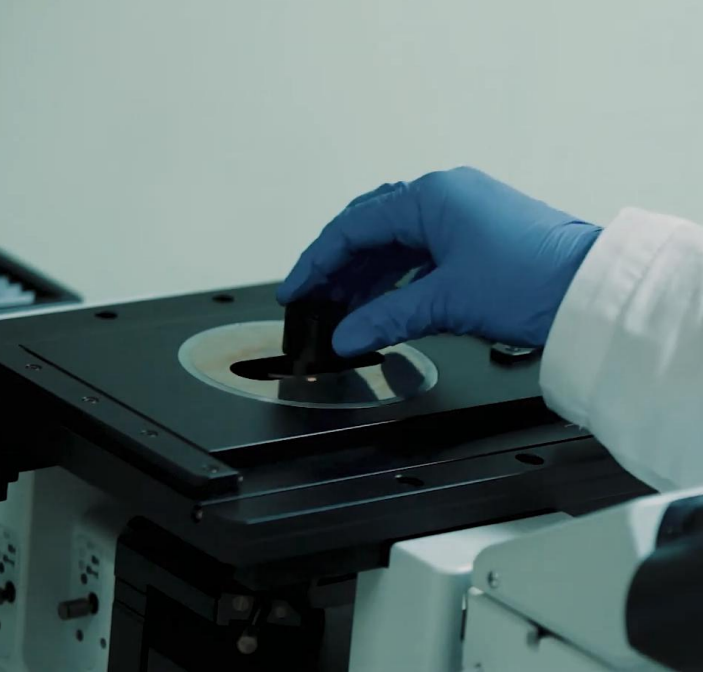
5

FUNDING

CINTECX




KRÜSS
EasyDyne



FUNDING

The acquisition of financial resources from public calls is essential for the development and maintenance of research activities at CINTECX. In this regard, the research staff of the centre has focused on participating in projects funded through international programs such as Horizon Europe, as well as the National Research Plan and regional government grants. These funds, closely linked to the scientific output of CINTECX personnel, have had a positive impact on both the quantity and quality of the results obtained.

CINTECX positions itself as a reference centre in terms of funds acquired, totaling more than €4.7 million obtained during 2024, representing a 5.3% increase compared with the previous cycle, consolidating a positive trend of progress at the centre (Figure 14).

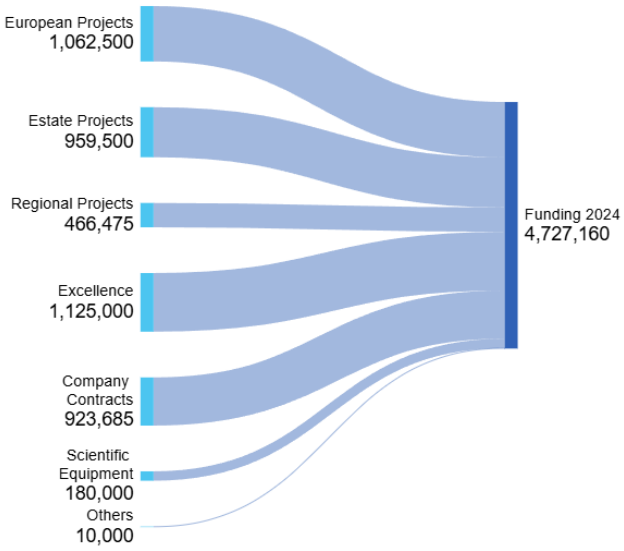


Figure 14. Funds secured by CINTECX in 2024.

Projects

During 2024, CINTECX stood out for its ability to secure competitive funding, consolidating its role as a leader in research and technological development. At the regional level, €1.125 million was obtained, representing 30% of the excellence grants of the University of Vigo, distributed among Competitive Reference Groups, Groups with Growth Potential, and Excellent Trajectories. This achievement highlights the strategic role of the centre as a driver of scientific excellence in Galicia and within the University of Vigo.

Additionally, this year marked the start of the project "Intelligent and Sustainable Factory through Advanced Power Electronics and Augmented Reality" (Fisterra), a public-private partnership between Norvento, CTAG, and researchers from the Applied Power Electronics Technology (APET) group at CINTECX. The project, co-financed by the European Union, has a budget of €2.6 million, with the Galician Innovation Agency of the Xunta de Galicia financing 60% of it (Figure 15).

Figure 15. Presentation event of Fisterra.

Also notable this year is the launch of the public-private project Facendo+: Industrial Competitiveness and Electromobility through Innovation and Digital Transformation Plus, led by Stellantis and co-financed by the Xunta de Galicia through FEDER funds. The project, with a total investment of €19,051,501.16, includes the participation of the Energy Technology Group (GTE) from CINTECX, as well as entities such as CTAG, AIMEN, EnergyLab, Gradiant, Unimate, SFC Solutions, Probotec, and Merasys. Its work lines focus on key areas such as the Factory of the Future, the Vehicle of the Future, IT Connectivity and Infrastructure, and Sustainability.

International

At the international level, CINTECX is leading two new projects: one under the Horizon Europe program and another under the AXA Fellowships program, with combined funding of €1,062,500. Alongside previous projects, the centre has 8 active projects running during 2024.

Among the most notable is the European project Infra-Rob, focused on recycling and minimizing construction waste, led by Professor Pedro Arias, head of the Applied Geotechnologies group (GEOTECH), with total funding of €5,005,648.75.

In the same line is the project SUM4Re, also led by the same research group, with funding of €5,999,897.72. This project promotes sustainable practices in the construction sector, reinforcing CINTECX's commitment to innovation and sustainability in key industries.

SUM4Re

SM4Re: Creating materials Banks from digital urban mining

CINTECX: 922 500,00€ 2024-2027
PI: Pedro Arias Sánchez

H_2-ZeroWaste: Green-Hydrogen from Agroindustry Waste

CINTECX: 140 000,00€ 2024-2026
PI: Aida M.ª Díez Sarabia

Other international projects led by CINTECX researchers include EVERGLASS, directed by Professor Juan María Pou and Professor Rafael Comesaña from the Industrial Laser Applications group (LASERON), with total funding of €2,961,225.00 under the EIC Pathfinder call of the Horizon Europe program. This project aims to develop innovative technology to recycle all types of glass using lasers. This technology will transform glass waste into new customized products, promoting a circular economy and reducing the amount of glass ending up in landfills.

Within the Sustainability and Natural Resources research area, besides leading projects, CINTECX is established as an important reference in the European research landscape, collaborating as a partner in the BioReset project under the Biodiversa+ program.

Success is also noted in INTERREG calls, including the project IBEROS+, a follow-up to the successful IBEROS project, which had nearly €2 million in funding in its previous edition and was led by Professor Pío Manuel González from the New Materials group (FA3). In this new edition, co-financed by the European Regional Development Fund through the INTERREG VI cooperation program, IBEROS+ secured €2,174,746.72 to consolidate the biofabrication sector in the Euroregion, focusing on tissue and organ engineering as well as personalized medicine, addressing major socio-health challenges linked to population aging in this field.

In the energy area, CINTECX groups participate as partners in European projects such as AOWINDE and COMENERG, focused on offshore wind energy and local energy communities. Aligned with the centre's green hydrogen strategy, it is important to highlight the project led by Ramón y Cajal researcher Aida Díez Sarabia from the Bioengineering and Sustainable Processes group (BIOSUV). She received funding from the AXA Research Fund for her project H2-ZeroWaste. With a budget of €140,000, this project explores the use of agro-industrial waste as catalysts to produce hydrogen more economically and sustainably (Figure 16).

Infra ROB	870 000,00 €
SUM4Re	922 500,00 €
EVERGLASS	783 750,00 €
BIORESET	112 469,98 €
iberos+	203 935,98 €
AOWINDE	162 198,47 €
comenerg	153 351,34 €
H_2-ZeroWaste	140 000,00 €

Figure 16. Funds obtained by CINTECX for active international projects in 2024.

National and regional

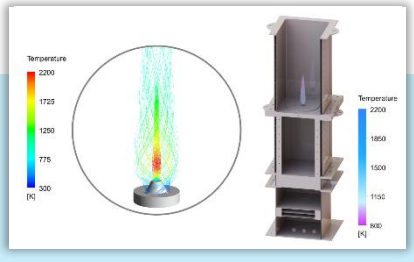
At the national level, CINTECX secured funding for six projects from the State Research Agency, focused on areas such as water sustainability, green hydrogen production, and participation in the DUNE experiment, totaling nearly 1 million euros.

In addition, funding was obtained for three predoctoral contracts, enabling the recruitment of new researchers to the centre and strengthening its commitment to emerging talent and the training of a new generation of scientists and technologists. Below is a brief description of the projects obtained:

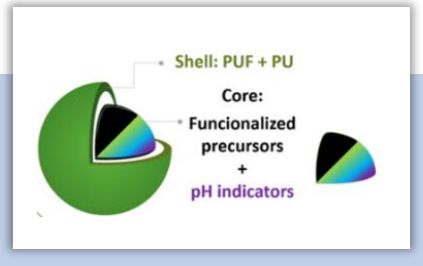
G-Free: Advancing Towards a Greener Future: Integration of Environmentally Friendly Materials for Water Purification and Renewable Energy Initiatives

CINTECX: 275 000,00€ 2024-2027
PI: Marta María Pazos Currás

H2FIREX: Development of Advanced Strategies for Efficient Pure Hydrogen Combustion for Real-Scale Applications

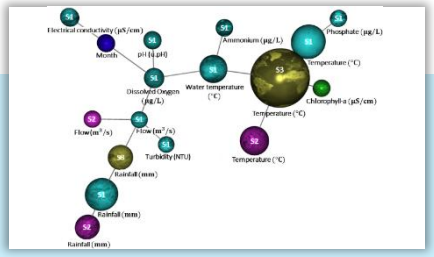


CINTECX: 218 750,00€ 2024-2026
PI: Jose Luis Míguez Tabares



SmartCoDur: Extension of Service Life of Concrete Structures Reinforced with Shape Memory Alloys through the Application of Self-Healing Coatings

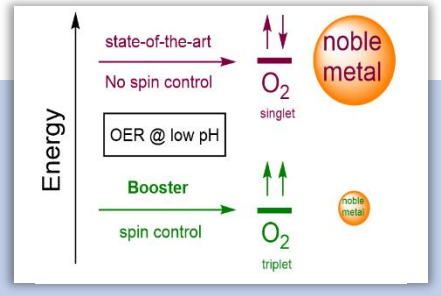
CINTECX: 172 500,00€ 2024-2027
PI: María Carmen Pérez Pérez



DLWATER: Improvement of Water Quality Management: Dynamic Models Using Machine Learning and Deep Learning

CINTECX: 122 500,00 € 2024-2027

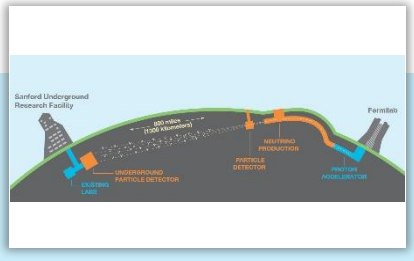
PI: María Araújo Fernández



Booster: Robust Quasi-Optical Systems to Enhance the Oxygen Evolution Reaction in Water Electrolysis

CINTECX: 96 250,00€ 2024-2027

PI: José Lorenzo Alonso Gómez



SUEDE: Contribution of the University of Vigo to the Advancement of the DUNE Experiment

CINTECX: 74 500,00€ 2024-2026

PI: Joaquín Baltasar Collazo Rodríguez

As shown in Figure 17, CINTECX, despite being a collaborative centre, achieved better results than other CIGUS centres at the University of Vigo, highlighting the outstanding work and recognition of the centre's research staff. This achievement underscores CINTECX's ability to excel not only in securing funding but also in the excellence of its research and its contribution to the scientific and technological development of the University of Vigo.

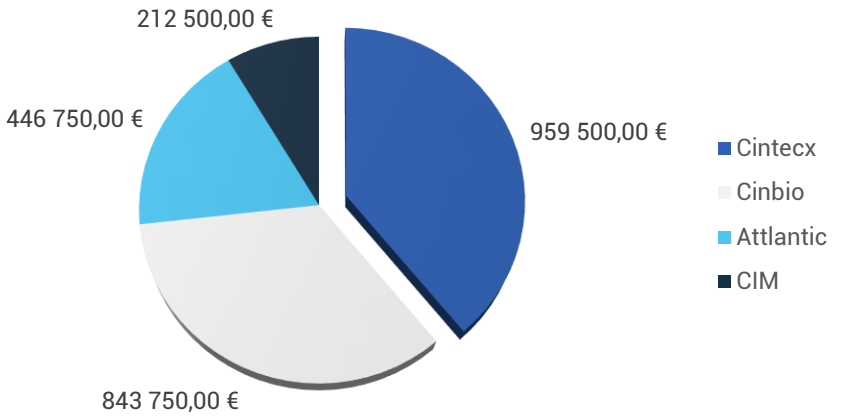


Figure 17. Funds obtained by research centres in the 2023 knowledge generation call from the AEI.

In 2024, CINTECX has also achieved outstanding results in calls aimed at consolidating, structuring, and specializing the most competitive research units within the Galician R&D&I System. These grants, organized into three modalities, reflect the centre's commitment to research excellence and the development of high-impact lines of work in the scientific and technological fields.

Modality A – Competitive Reference Groups (GRC): This modality aims to consolidate research groups that, due to their scientific output and R&D activity, are leding references within the Galician R&D+i System. In 2024, the GEOTECH group, led by Henrique Lorenzo Cimadevila, and the GTE group, headed by José Luis Míguez Tabarés, stood out for their excellence and obtained joint funding of 400,000 euros, highlighting their leadership and relevance in their respective fields.

Modality B – Growth Potential Groups (GPC): Targeted at research groups with a promising trajectory and capacity to become references within the Galician R&D+i system. The Corrosion and Materials Engineering (ENCOMAT) group, coordinated by Xosé Ramón Nóvoa, secured funding of 120,000 euros, reflecting its continuous efforts and potential to achieve higher levels of scientific consolidation.

Modality C – Projects for Researchers with Excellent Trajectories: Focused on individual researchers with established or emerging careers, aims to strengthen high-impact research lines at national and international levels. In this category, Drs. Jesús Balado Frías and Mario Soilán Rodríguez secured a total of 205,000 euros to develop projects aligned with regional and state research priorities. This result reinforces the centre's commitment to supporting both established researchers and early-stage talents with excellence potential.

ARVIAL: Traffic Signs in Augmented Reality for Driver Assistance

CINTECX: 115 000,00€ 2024-2028

PI: Jesús Balado Frías

GeovIA: Geomatics and Generative Artificial Intelligence for Inventory and Calculation of Road Infrastructure Safety Indices

CINTECX: 90 000,00€ 2024-2027

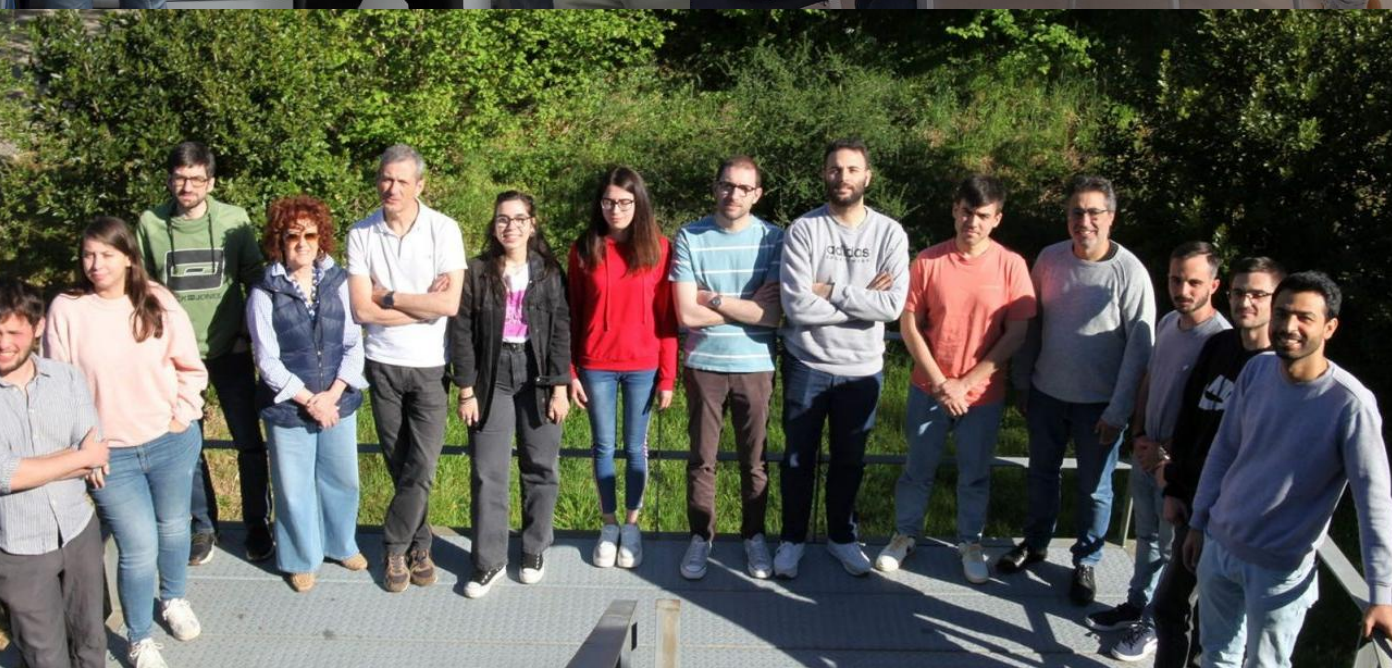
PI: Mario Soilán Rodríguez

6

RESEARCH AND TRANSFER

CINTECX


CINTECX
Centro de Investigacion en Tecnologias, Energia y Procesos Industriales
Universidade Vigo
PLAN DE INNOVACIÓN



RESEARCH AND TRANSFER

Research and transfer of scientific and technological knowledge are fundamental pillars of CINTECX, aligned with its mission to generate innovation with a direct impact on the social and economic environment. As part of the Galician university system, CINTECX is committed to scientific excellence to position itself as a national and international leading reference. This commitment is reflected in the 2024-2027 Strategic Plan, specifically in Objective 1: "Generation of excellent scientific and technological knowledge, promoting an ecosystem of open and accessible science, and fostering ethics in research."

Publications

CINTECX is committed to scientific excellence with the aim of generating knowledge that is useful to the community and positioning itself as a reference centre at both national and international levels. This strategy is outlined in Objective 1, "Generation of excellent scientific and technological knowledge, supporting an accessible and open science ecosystem, and promoting ethics in research," of the 2024-2027 Strategic Plan (Figure 18).

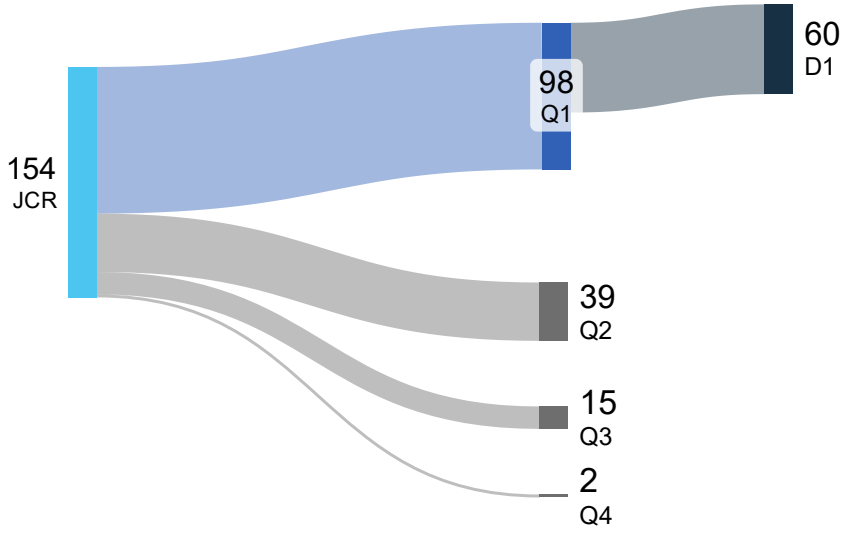


Figure 18. Summary of CINTECX JCR publications in 2024.

The centre actively promotes Open Access publishing through its own policy, which sets clear guidelines to ensure proper open dissemination. This initiative aims to increase the visibility and impact of research results, guarantee their long-term preservation, and facilitate that authors receive appropriate recognition and citations.

75 % of open access publications in 2024

In this way, the link between research activity and society is strengthened, fostering innovation, promoting transparency, and facilitating accountability regarding public investment in research.

PhD theses

In 2024, CINTECX continued to strengthen its commitment to training new high-level researchers through the defense of 18 doctoral theses, of which 11 received international distinction. This achievement reinforces the centre's academic excellence and its standing in the global scientific community (Figure 19).

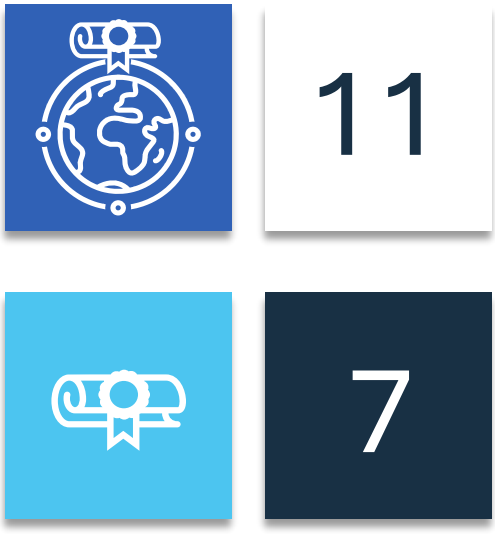


Figure 19. Distribution of theses defended by researchers with international and national distinction in 2024.

Collaborations with companies

CINTECX stands out for its strong track record of collaboration with the productive sector and its expertise in knowledge transfer, complementing its activities through strategic cooperation with nearby technology centres. This commitment to linking with the industrial sector is realized through the provision of specialized services, enhancing companies' technological capabilities, and promoting direct technology transfer at both national and international levels.

During 2024, the centre formalized 93 new contracts with over 33 companies, achieving funding of €0.93 million. Additionally, revenues increased by 1.1% compared with the previous year, consolidating its capacity to generate economic and social impact through knowledge and technology transfer (Figure 20).

93 new contracts +30 companies 0,93 M€

Figure 20. Companies collaborating with CINTECX.

These partnerships enabled the development of advanced technological solutions tailored to the needs of strategic sectors. Notably, the creation of innovative prototypes showcased at international events such as Navalia highlights the centre's potential to lead industrial innovations, increase its visibility, and strengthen its network of industrial contacts.

Patents

At CINTECX, continuous efforts are made to promote knowledge transfer and innovation, positioning Galicia at the forefront of applied research. During 2024, the centre has strengthened its position by managing a total of 54 intellectual property assets, including patents, software, know-how, and patent exploitation rights.

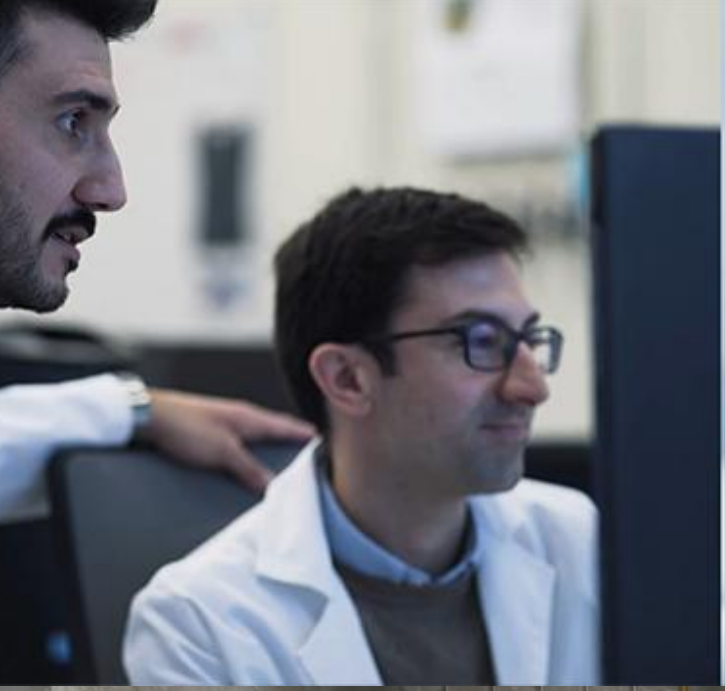
Of these, 37 correspond to patents, with 7 having been registered in the past year, underscoring our commitment to developing innovative technological solutions that address today's societal challenges.

Additionally, the centre remains committed to training in intellectual property, providing its research staff with key tools for the proper management and protection of results derived from their research activities. These initiatives not only enhance the centre's transfer capacity but also boost the impact of the research developed at CINTECX, ensuring its sustainability and relevance within the R&D&I system.

7

RESEARCHER CAREER

CINTECX




CINTECX

RESEARCH CAREER

Talent attraction and retention

Regarding talent attraction, in 2024 the centre welcomed numerous new researchers, ending the year with a total of 40 early-stage predoctoral researchers from various programs and 21 postdoctoral researchers (Figure 21).

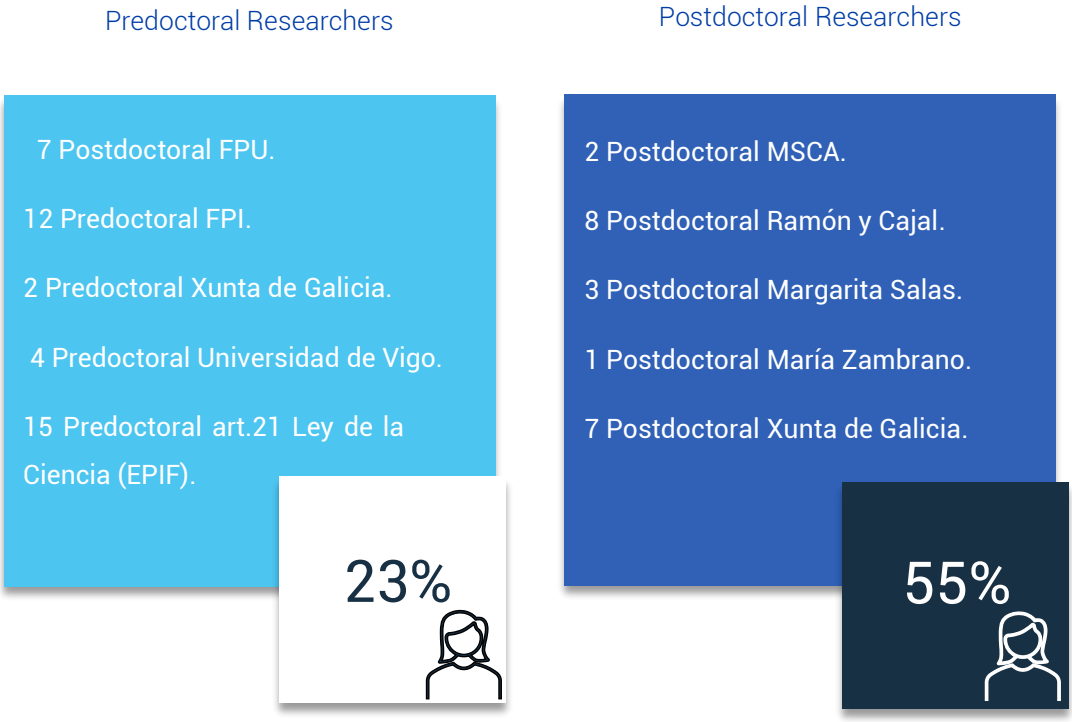


Figure 21. Summary of the centre's predoctoral and postdoctoral staff in 2024.

Among these new hires, the two Ramón y Cajal grants obtained stand out, as well as a grant from the Universidade de Vigo's Talent Retention Program and two additional Postdoctoral grants from the Xunta de Galicia. Furthermore, in the 2024 resolution of the Juan de la Cierva call, CINTECX achieved excellent results with the planned incorporation of a researcher from the University of Porto in 2025. These additions strengthen the centre's capabilities in strategic areas, ensuring generational renewal that enhances its long-term sustainability.

The centre is also intensifying its efforts to attract high-level talent, with special emphasis on re-engaging researchers who have previously been part of CINTECX and currently work in other prestigious laboratories.

In 2025, CINTECX expects to continue consolidating its international presence through participation in excellence programs from which it has already benefited, such as the Marie Skłodowska-Curie Actions (MSCA). Within the framework of the 2025 call, the centre anticipates a favorable outcome that will allow the awarding of at least two new MSCA fellowships.

Promotion of the centre's culture

CINTECX *Challenge*

One of the key elements of CINTECX's success is the active promotion of interdisciplinary collaboration among its research groups. This strategy optimizes available resources and fosters synergies that increase the quality and relevance of scientific results. In this context, the CINTECX Challenge stands out, an annual competitive call open to all CINTECX research staff. This program annually funds a research project in the field of Industrial Technologies, which must present a collaborative proposal between different CINTECX groups. The project lasts one calendar year, and during the final months, the results are presented at a specific event, with the aim of reaching a general audience. In addition, dissemination activities are carried out in accordance with the policies of CINTECX and the University of Vigo.

The CINTECX Challenge program, consolidated as a key tool, fosters cooperation between research groups to address cross-cutting challenges. It also emerged as a proposal to encourage collaboration among young researchers and offers them an opportunity to demonstrate their ability to lead projects (Figure 22).

Figure 22. Principal investigators of the two awarded projects in the CINTECX Challenge 2024 Call.

In 2024, two projects stood out:

- Optimization and scaling of electrochemical water splitting for hydrogen generation; a project led by Dr. Díez from the BIOSUV group, which, in collaboration with the FA3 and GTE groups, seeks a feasible alternative to address high energy demand and environmental issues related to the CO_2 excess in the environment.
- Sustainable strategies for urban art conservation (Smart); a proposal led by two postdoctoral researchers, Dr. Antonio Pozo and Dr. Pérez Orozco, with a total of six researchers participating from CINTECX groups: Safe and Sustainable Management of Mineral Resources (GESSMin) and GTE. Notably, the Smart project, focused on the conservation of urban art through sustainable strategies, gained international recognition by receiving the award for the best oral presentation at the MetroArcheo2024 conference.

Shared theses

Collaboration between research groups in thesis supervision is common practice. This year, a pioneering thesis was defended on the application of lasers as a method for cleaning shale. Titled "Application of Laser Techniques in the Conservation and Restoration of Archaeological Sites," the doctoral thesis was presented by researcher Pablo Barreiro on May 30th at CINTECX. This work was carried out collaboratively between the GESSMin and FA3 groups.

Mobility grants

CINTECX launched a 2024 Call for Grants to Support Attendance at Conferences, Scientific Meetings, Visits, or Short Research Stays. The purpose of these grants was to promote the internationalization and global impact of the research carried out at the centre. Thanks to this call, three researchers attended international conferences, showcasing their work and representing the CINTECX brand.

In addition, five researchers undertook research stays in the USA, Sweden, the United Kingdom, Portugal, and Germany through this program, enabling CINTECX to establish international relationships and benefit from collaborations with other universities.

These initiatives foster internal synergies and allow for efficient resource mobilization, increasing the relevance and impact of CINTECX's scientific results.

Training program

CINTECX reaffirms its commitment to training young and diverse research talent through a comprehensive training program designed to foster research excellence. During 2024, the centre intensified its efforts in organizing training activities covering both technical aspects and essential transversal skills for the professional development of its researchers.

The centre has continued its Mentoring program through the Scientific Seminars. This space is aimed at young researchers, both predoctoral and postdoctoral, offering them the opportunity to practice and refine their presentation skills. The seminars also encourage interaction and knowledge exchange among the centre's staff, fostering internal synergies and interdisciplinary collaboration.

Regarding the protection of research outcomes, CINTECX has strengthened its technology transfer strategy in collaboration with the consultancy ClarkeModet, aiming to design optimal protection strategies for ongoing developments. These actions have helped reinforce the safeguarding of the centre's intangible assets, minimize risks associated with research results, and increase project value through adequate intellectual property protection—thus strengthening its relationship with industry and its commitment to sustainability and innovation.

Efforts have also been made to boost the internationalization of research groups and CINTECX as a whole, through the planning of European proposal preparation workshops for the centre personnel, scheduled to launch in 2025 with the prestigious consultancy RDTI. The program focuses on Horizon Europe within the European R&D&I framework, aiming to position CINTECX as a strategic partner in the Horizon Europe program for companies and consortium members. An analysis of the current context in the Horizon Europe program will identify strengths and weaknesses, and an executive summary will be prepared to clearly communicate the centre's objectives and capabilities. This program will lay the foundation for actions during 2025-2027, consolidating CINTECX as an internationally recognized technological partner.

Throughout the year, CINTECX promoted staff training through a total of eight courses, involving 122 researchers. These courses included technical training on the use of the centre's equipment, specialized training in scanning electron microscopy, and transversal training on intellectual property, industrial property, and patents. The training aligns with the research areas of the various working groups, providing strategic support to both established researchers and new doctoral students beginning their research careers (Figure 23).

The dissemination of these training activities was carried out via social media, targeted email distribution lists for research staff, and through news on the website and the five-year bulletin, ensuring effective communication to all users. The impact of these trainings is reflected in the increasing number of service and

self-service requests in the centre's common-use laboratories, as well as in the quality of research carried out at CINTECX.

To evaluate the effectiveness of the training, satisfaction surveys are conducted with participants following ISO 9001 standards, allowing assessment of both the trainers' performance and the relevance of the content to the researchers' work lines. Moreover, the courses are recorded and made available to attendees for later review, maximizing knowledge transfer and ensuring an efficient return on investment in this area.

These actions consolidate CINTECX's commitment to training a new generation of highly qualified researchers capable of addressing current scientific and technological challenges with excellence, interdisciplinary vision, and an innovative approach.

Figure 23. Summary of the main 2024 training courses organized by CINTECX.


Dr. D. Pedro Arias Sánchez


2024 INTERNATIONAL CONFERENCE ON
Metrology for Archaeology and Cultural Heritage
Valletta, Malta / October 7-9, 2024
METRO ARCHAEO
MALTA 2024
VALLETTA CAMPUS
With the Patronage of


POINT-UP STORE 2024


RAGC
Universidad
A Real Academia Galega de Ciencias e a Universidade Intercontinental da Empresa
acordaron concederlle o Premio RAGC-UIE para Investigadoras e Investigadores Xoves
na categoría de Ciencias Básicas a
Dra. Dna. Belén Riveiro Rodríguez

National projection

Representation in institutions

CINTECX strengthens its projection and commitment to excellent research through the active representation of its research staff in institutions, associations, and networks at both national and international levels.

At the national level, researcher Belén Riveiro coordinated the network "Monitoring and Inspection for In-Service Structural Assessment – MonitoRED," funded by the Ministry of Science and Innovation. This network brings together Spain's most prominent research groups in structural monitoring, positioning CINTECX as a key player in this field. Additionally, researchers such as Marcos López, Joaquín Baltasar Collazo, Enrique Casarejos, and Abraham Segade have represented the centre as active members of the Spanish Association of Mechanical Engineering, with involvement spanning more than five years.

Furthermore, Marta Pazos played a leading role as a manager at the Spanish Research Agency in the scientific area of Environmental Sciences and Technologies (CTM) and the subarea of Environmental Technologies (TMA). Henrique Lorenzo served as a manager in the Energy and Transport area (EYT) and the Energy subarea (ENE), while Pedro Arias held the position of manager in the Industrial Production, Civil Engineering, and Engineering for Society area (PIN).

Ángeles Sanromán was part of the Agency for Scientific and University Quality of Andalusia, serving as a member and secretary of the Engineering and Architecture Commission. She also coordinated the Biochemical Engineering Section within the Spanish Society of Biotechnology (SEBIOT).

Santiago Pozo actively participated in multiple scientific and professional associations, such as TechnoHeritage and the Specialized Chemistry Group for the Study and Conservation of Cultural Heritage of the Royal Spanish Chemical Society (GEQP-RSEQ).

These individual representations in scientific networks and associations consolidate CINTECX's position as a reference in multidisciplinary research and reinforce its contribution to advancing knowledge through collaboration with national and international scientific communities.

Awards and recognitions

During 2024, CINTECX has been the recipient of notable recognitions that highlight both the scientific excellence of its research staff and the social impact of their work. Professor Pedro Arias was honored with the prestigious Isidro Parga Pondal Award, granted by the Royal Academy of Sciences of Galicia (RAGC), in recognition of his outstanding career in technical sciences. His research in geotechnologies, particularly in developing geointelligence that combines artificial intelligence and geospatial information, has proven key to addressing challenges related to cartography and the management of massive geodata.

Researcher Belén Riveiro has established herself as one of the most promising young investigators. She received the RAGC-UIE Awards for Young Researchers in Technical Sciences and was also awarded the Juan López de Peñalver Medal by the Royal Academy of Engineering, with the ceremony scheduled for January 2025. This recognition adds to her list of achievements, including the 2022 National Matilde Ucelay Award in engineering and architecture, of the Spanish Ministry of Science, Innovation and Universities, underscoring her outstanding contribution to technical and scientific research.

On the international stage, researchers Leandro Rafael Alejano and Ignacio Pérez received the Giovanni Barla International Award for the best article of 2023 for their publication "Hydrodynamic Loads on Rectangular Pontoon-Like Structures in Random Seas Using CFD and a Morison Force Model." This innovative work highlights advances in the study of hydrodynamic interactions on floating structures, employing advanced computational fluid dynamics tools.

CINTECX's young talent was also recognized with the First Prize for Final Degree Project in Entrepreneurship, awarded to researcher Antón Puga from the BIOSUV group for his innovative research on advanced technologies for the treatment of micro-contaminants. This prize, granted by the University of Vigo, highlights the centre's ability to promote the intersection of research and entrepreneurship in areas of social and environmental impact.

Furthermore, on the international front, nine CINTECX researchers were recognized by Stanford University as part of the top 2% of the world's most influential scientists due to their impact in their respective fields (Figure 24). Among them stood out Dr. Gómez Yepes, a young Ramón y Cajal researcher who, despite his youth, has secured a position among the most globally impactful scientists, reflecting the high quality and international relevance of the research carried out at CINTECX.

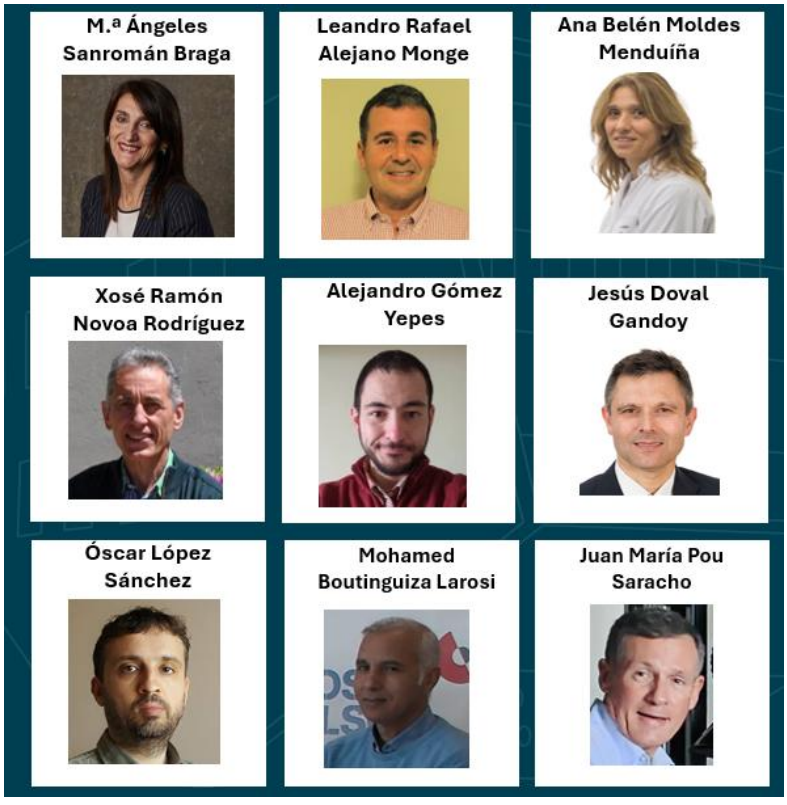


Figure 24. Research staff among the top 2% most cited worldwide at CINTECX, according to the 2024 Stanford–Elsevier Ranking.

Additionally, CINTECX's social impact was highlighted in the newspaper article "Scientists Revolutionizing Research from Vigo," published in Faro de Vigo. This article, which showcases the work of female researchers at the centre, was awarded the 2024 Celia Brañas Award for Science Journalism, organized by the Royal Galician Academy of Sciences (RAGC) in collaboration with the Xunta de Galicia through the Galician Innovation Agency (GAIN). This recognition not only emphasizes the importance of scientific outreach but also enhances the visibility of the work carried out at CINTECX, particularly in promoting and highlighting the role of women in science, thereby contributing to a positive impact on society.

International projection

CINTECX continuously strengthens its international impact and visibility through the active participation of its research staff in prestigious organizations, the submission of proposals to competitive European calls, and collaboration with universities and international institutions.

Since 2022, researcher Carmen Pérez has chaired Division 4 of the International Society of Electrochemistry (ISE), a nonprofit organization based in Lausanne, Switzerland, focused on Materials Science and its link to Electrochemistry. Likewise, Jacobo Porteiro, a CINTECX researcher, has represented Spain in the Combustion Technology Collaboration Program of the International Energy Agency (IEA) since 2014. Additionally, Santiago Pozo has consolidated his participation in the International Society for Rock Mechanics (ISRM), reinforcing the centre's involvement in international scientific associations.

Other CINTECX researchers stand out for their affiliations with key international organizations. Óscar López, Alejandro Gómez Yepes, and Jesús Doval are members of the IEEE Power Electronics Society and the IEEE Industrial Electronics Society. Jesús Doval has also been active in the IEEE Industrial Applications Society and the Power Engineering Society. Félix Quintero Martínez has been part of the TC28 committee of the International Commission on Glass, dedicated to glass fibers for reinforcement and insulation.

Regarding European calls, CINTECX has submitted proposals for excellence projects: for the ERC 2024 Consolidator Grant, the project "Real-Time Damage Quantification of Bridges: Beyond Structural Health Assessment" (ERCEA), focused on bridge damage evaluation through deep learning; and for the ERC 2025 Starting Grant, the project "Generating Renewable Opportunities with Adsorption Waste-derived Technology for Hydrogen synthesis" (GROWTH), centered on sustainable design, waste treatment, and carbon storage. Moreover, the centre's director, Dr. Mª Ángeles Sanromán, was selected as a member of the ERC Consolidator Grant evaluation panel, highlighting CINTECX's leadership in the European scientific community.

In 2024, CINTECX hosted visits from prominent international researchers, strengthening ties and fostering new collaborations. Notably, Dr. Torsten Sulima from Universität der Bundeswehr Munich visited CINTECX for a short stay to collaborate on advanced two-dimensional materials. Alongside researcher Stefano Chiussi, he used the Nikon SMZ25 stereoscopic microscope to characterize metal disulfides and diselenides such as tungsten and molybdenum, continuing a collaboration spanning over twenty years. Additionally, Dr. Pablo Lamata, director of the Doctoral Training Centre in Digital Twins for Health – dt4health at King's College London, visited on February 13. Accompanied by Professors Eduardo Suárez Porto and Abraham Segade, he explored biomedical research projects and held meetings with researchers including Pío González, leader of the New Materials group.

CINTECX promoted the international mobility of its research staff and hosted academics from renowned institutions in Turkey, Tunisia, Morocco, and Germany for research stays and doctoral training. These collaborations were complemented by research stays of CINTECX personnel at prestigious European universities and centres such as the University of Jyväskylä (Finland), Montanuniversität Leoben (Austria), University of Porto (Portugal), Università della Svizzera Italiana (Italy), and the GSI Helmholtzzentrum für Schwerionenforschung (Germany).

+10 International researchers hosted at CINTECX for research stays

+20 CINTECX researchers on international stays

9 Theses with international mention

Besides these mobility initiatives, CINTECX has strengthened its international projection through scientific collaborations that included joint publications, participation in projects, and research stays, promoting knowledge transfer and the exchange of ideas at a global level (Figure 25). These actions have consolidated the centre's position as a leading reference in research and technology worldwide.

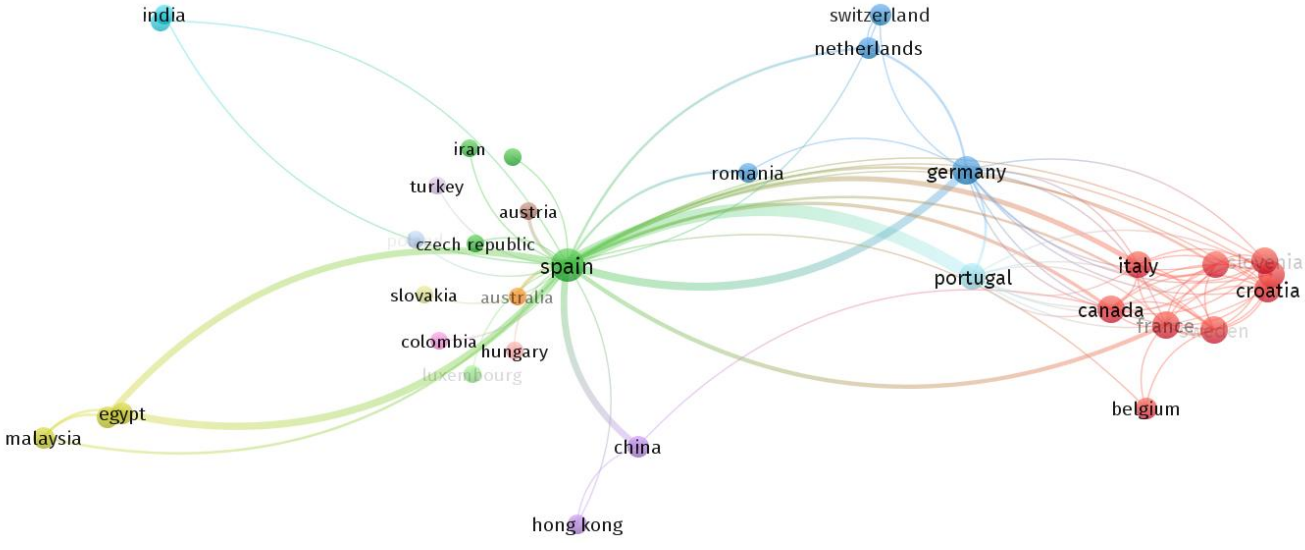


Figure 25. Summary map of CINTECX's scientific collaborations over recent years. Source: Scopus.

8

EQUALITY IN RESEARCH

CINTECX


CINTECX


GUÍA PRÁCTICA
PERSPECTIVA DE GÉNERO
EN EL ÁMBITO
TECNOLÓGICO E INDUSTRIAL
1. ¿Qué es la guía y por qué es necesaria?
Sesgos de género en el ámbito tecnológ
¿Quieres saber más?
CINTECX


Distintivo de
igualdade


23 junio 2024
Día Internacional de la Mujer
en la Ingeniería
CINTECX
Centro de Investigación en Tecnologías,
Energía y Procesos Industriales
Universidade Vigo
XUNTA DE GALICIA
Cofinanciado por la Unión Europea
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ELECTRÓNICA
Y AUTOMÁTICA
CÁMARA
CINTECX
ABIERTA
[11F Día de la Mujer y la Niña en la Ciencia]
CINTECX
Centro de Investigación en Tecnoloxías,
Enerxía e Procesos Industriais
Universidade Vigo

EQUALITY IN RESEARCH

CINTECX has intensified its efforts to promote gender equality through events, campaigns, and publications, solidifying its commitment to equality and earning the Equality Distinction from the Universidade de Vigo. Figure 26 highlights the main milestones in CINTECX's equality initiatives in 2024, including the development of the Practical Guide to Gender Perspective in the Technological and Industrial Fields, created within the framework of the Feminisms 4.0 Depo-UVigo Chair. This guide was presented at a hybrid event featuring a panel of experts, providing specific tools to integrate a gender perspective into research, thereby enhancing its inclusivity and quality.

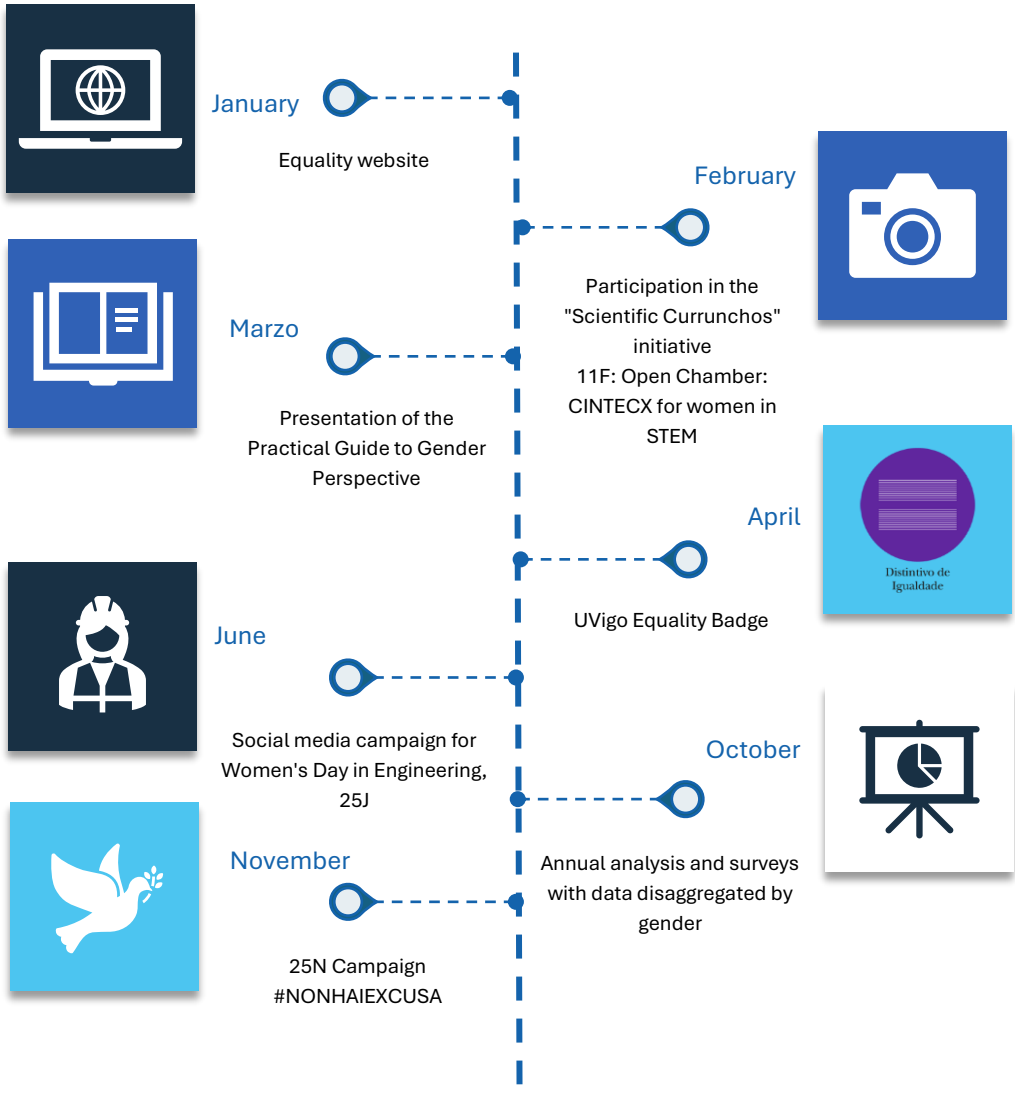

Figure 26. Summary of the main milestones in research equality at the centre in 2024.

In addition, CINTECX carried out campaigns such as "Open Camera: CINTECX for Women in STEM" on the occasion of February 11th, the International Day of Women and Girls in Science, to highlight the role of female researchers in science and technology. The campaign gave voice to their career experiences and later presented a summary video on March 8th, International Women's Day.

Also, on June 23rd, the International Women in Engineering Day, the centre promoted a social media campaign featuring testimonials from its female researchers, showcasing their work, vocation, and contributions to the scientific field, emphasizing the impact of women on research and engineering. These actions demonstrate CINTECX's ongoing commitment to gender equality, positioning it as a benchmark in promoting equity in scientific, technological, and industrial fields.

The year ended with the creation of an illustrated calendar featuring women researchers from the centre, aiming to make visible their presence and work, as well as to inspire and motivate new generations of scientists. Each illustration includes a text where the researchers describe their research lines, achievements, motivations for pursuing research, and how they contribute to society, concluding with recommendations and advice for future female researchers (Figure 27).

Figure 27. Women researchers calendar and bookmarks.

9

COMMUNICATION AND OUTREACH

CINTECX


CINTECX


PERFORACIÓN E VOADURA
CINTECX
GESSMin

COMMUNICATION

The communication strategy of CINTECX aligns with the Communication Plan of the University of Vigo, continuing with established and relevant actions for the centre, while implementing the new guidelines of the CINTECX Strategic Plan 2024-2027. This strategy prioritizes the visibility of research, knowledge transfer, talent attraction, and international projection, aiming to make science accessible both to the research community and to society at large, promoting scientific culture and the social impact of innovation (Figure 28).

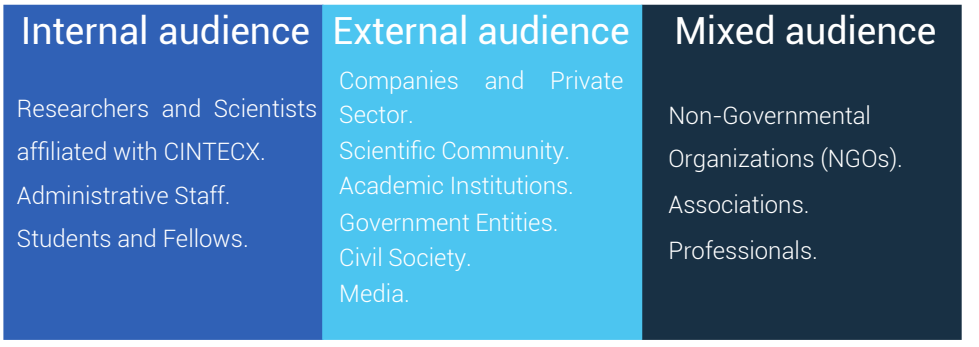

Figure 28. Diagram of the different types of media audiences of CINTECX.

The specific communication objectives focus on strengthening a distinctive identity, bringing science closer to the general public, facilitating the attraction of companies through technology transfer, and increasing international visibility. Internally, efforts are made to improve communication channels and strengthen the centre's culture, consolidating these actions as a transversal strategic axis that guides CINTECX's active integration into the surrounding innovation ecosystem.

Posters and merchandising

The corporate image of CINTECX is structured around the logo and the distinctive graphic element of the ribbon, reinforced by the figure of the centre's building, which has become a unique architectural icon and the representative image of the brand. During 2024, efforts have been made to maintain and strengthen this visual identity, which fosters an internal sense of belonging and improves the external projection.

Following the recognition by the Xunta de Galicia as a collaborative centre within the CIGUS network, the corresponding logos and funding references have been incorporated across all communication channels and materials.

The communication materials developed (Figure 29) include the following:

- Posters: The CINTECX image has been adapted to various advertising supports such as roll-ups, informational project posters, stands, totems, and large-format signage. These elements are used at events and as visual reinforcement within the centre. Additionally, exclusive materials have been designed to promote activities like the CINTECX Challenge.
- Merchandising: The brand image is present on practical and reusable items such as notebooks, pens, water bottles, backpacks, lanyards with card holders, and bracelets. These materials are distributed at fairs, outreach events, open days, and as part of the welcome kit, strengthening CINTECX's presence in both internal and external activities.
- Promotional brochures: The institutional brochure has been updated in Galician and English, designed for international fairs, outreach events, meetings with companies, and institutional visits. Moreover, a brochure version of the Practical Guide on Gender Perspective in the Technological and Industrial Field has been created.
- Corporate clothing: Jackets, polos, and lab coats with the CINTECX logo have been distributed to the centre staff. These items, practical and functional for work in laboratories and offices, also reinforce the visual identity during events, fairs, and outreach activities.

Figure 29. Posters and merchandising materials featuring CINTECX's branding.

Social media

During 2024, CINTECX's social media strategy has made significant progress, becoming a key pillar in the centre's external communication. This advancement included the launch of a new corporate Instagram account at the end of April and the creation of a Bluesky account, which is currently in its initial phase. At the same time, activity was strengthened on existing social networks such as LinkedIn and X (formerly Twitter), increasing both the frequency of posts and engagement with target audiences.

These efforts led to substantial growth in the number of followers, rising from 795 in 2023 to 2,149 in 2024—nearly tripling the previous year's figure (Figure 30).

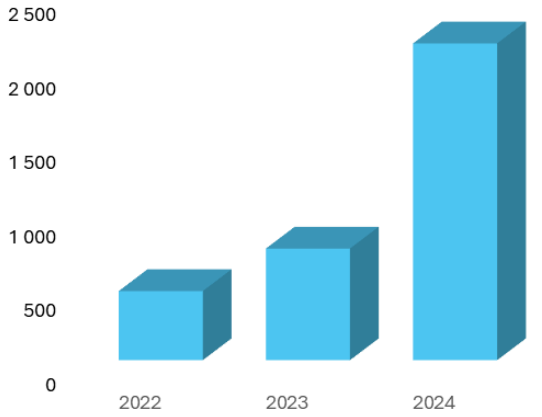

Figure 30. Increase in CINTECX's social media followers.

The following figure illustrates the increase in followers gained during 2024 by the centre on each social media platform.

+ 690
New followers

+ 110
New followers

+ 950
New views

+ 180
New followers

The content published on these platforms was focused on disseminating research, achievements of the staff, news about researchers, job offers, events, workshops, training courses, conferences, research stays, and scientific results outreach. This tailored approach for each network allowed a stronger connection with different types of users.

On platforms such as LinkedIn, X (formerly Twitter), and Instagram, the centre achieved over 229,800 impressions, with LinkedIn standing out as the most impactful due to its technical and professional focus. Despite being a recent addition, Instagram also showed significant growth.

In addition, specific campaigns were carried out, such as the one on June 23rd, 2024, for the International Women in Engineering Day, which reached nearly 10,000 views. These actions have strengthened CINTECX's visibility and impact, positioning it as a leading reference in its field of knowledge and expanding the dialogue between science, technology, and society.

Videos

CINTECX strengthens its commitment to scientific and technological outreach through the creation of audiovisual content. During this period, videos in various formats formats were produced, including event reports such as Open Days, educational pieces for initiatives like the CINTECX Challenge, and specific campaigns. It is worth highlighting the campaign "Open Camera: CINTECX to Women in STEM," designed to commemorate February 11th, the International Day of Women and Girls in Science.

All content is available on the centre's YouTube channel, although social media platforms have served as the main drivers for user engagement, gathering the majority of views. In 2024, the centre's content on YouTube has accumulated over 900 views, and the foundations have been laid to launch a strategy aimed at increasing YouTube views and attracting a larger audience.

+900 views	+5 000 impressions

Media and news

Increasing the visibility of CINTECX in conventional media, such as press, radio, television, and online platforms, remains a strategic pillar in its communication plan.

During 2024, the centre nearly tripled its media presence compared with 2023, reaching over 80 appearances by November, with December's data still to be added. These appearances spanned more than thirty different media outlets, with a especially strong presence in print and digital press. Furthermore, CINTECX featured on television and radio, with appearances on channels such as Cadena Ser, Radio Voz, Cadena COPE, SONUVigo, Atlántico TV, and Nos Televisión, among others.

+80 press appearances | **+30 different media outlets** | **+3M audience reached**

Among the appearances in national and local press, highlights include news pieces in *Faro de Vigo*, *Atlántico Diario*, and *Cadena Ser*, featuring interviews with researchers, coverage of awards, and updates on projects led by the centre (Figure 31).

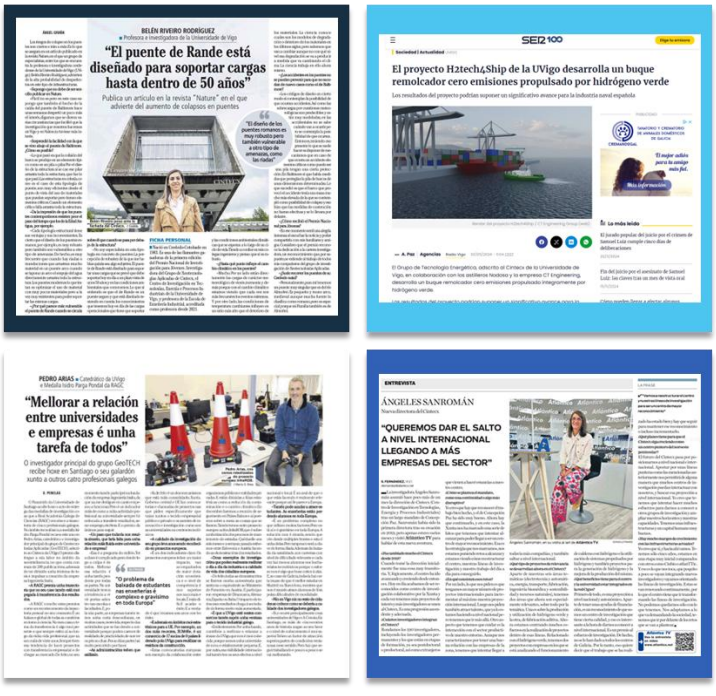

Figure 31. Examples of news about CINTECX published in the press.

Regarding the creation of original content, more than 80 news articles were published on the CINTECX website during 2024, consolidating an upward trend since the publications began in 2019. This effort strengthens CINTECX's commitment to generating original and relevant content, fostering a closer connection with the research community and society at large (Figure 32).

+80 news items on our website

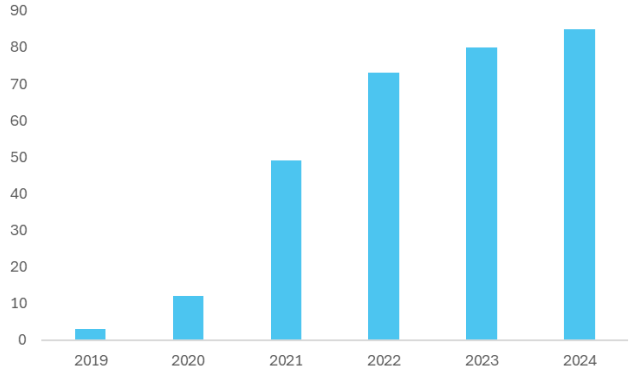

Figure 32. Original news published by CINTECX.

Internal communication

CINTECX's internal communication actions are aimed at motivating the culture and sense of belonging to the centre, fostering cooperation among research staff, conveying information of interest and usefulness to personnel, and consolidating transparency. During 2024, CINTECX has continued to use and improve the internal communication tools already implemented and has launched other initiatives. Among the tools used the following may be highlighted:

- CINTECX Newsletter: Periodic publications that inform about news, projects, ongoing calls, and relevant events, distributed through the CINTECX mailing list to subscribed centre members. Among this year's updates, a new section has been included in the newsletter with recommended readings on equality topics in research. Moreover, the newsletter's design has been refreshed, adapting to the centre's corporate colors and streamlining content distribution and organization.

- CINTECX Mailing List: Sending messages through the distribution list about news, ongoing projects, achievements, and relevant events.
- Regular meetings: Scheduled sessions that allow direct communication between different teams and management, as well as between management and the administrative team, facilitating coordination and collective decision-making.
- Collaborative digital platforms: Use of online tools that allow collaborative work, idea exchange, and joint problem-solving.
- Private area on the website: Password-protected platform for centre personnel to make room reservations, register new staff, access and download corporate identity materials, and consult internal documents such as internal regulations or data management strategy.

Aligned with the strategic plan objectives, in 2024 some actions were launched to promote a sense of belonging and create a healthy work environment. Among these initiatives, the design of a welcome kit stands out to facilitate adaptation to the new work environment and bring new staff closer to the centre's values and identity, helping them feel part of the team from the start.

In line with its commitment to fostering a healthy environment, CINTECX has integrated the promotion of healthy habits into its 2024-2027 Strategic Plan, while simultaneously strengthening the centre culture. To this end, several actions have been carried out to promote team well-being and encourage healthy habits, including the installation of sports equipment and a ping-pong table on the centre's second floor (Figure 33). Motivational messages with information about calorie expenditure have also been placed on the stairs to encourage and motivate movement. These initiatives reinforce CINTECX's commitment to creating a positive, inclusive, and healthy work environment aligned with the Sustainable Development Goals (SDGs), particularly SDG 3: Good Health and Well-being.

Figure 33. "Move at CINTECX" Campaign.

PUBLIC OUTREACH AND SCIENTIFIC CULTURE

During 2024, CINTECX carried out numerous activities aimed at promoting public outreach and bringing technological research closer to society. These initiatives combined the centre's own efforts with collaborations with other entities, such as the Scientific Culture Unit of the University of Vigo, with the goal of generating a positive impact on the perception and understanding of science among diverse audiences. Below is a summary of attendees and participation in events.

+3 000 Attendees at the events

+50 CINTECX's participations in events

Own initiatives

CINTECX has focused on building strong bridges between science, technology, and society through inclusive, educational, and participatory initiatives. One of the most notable activities was the Open Day, held on October 25, which brought together more than 150 technological high school students from various educational centres across Galicia. This event allowed participants to get a close look at CINTECX's facilities, interact with its research staff, and experiment with the centre's equipment through practical tours of the laboratories. During these visits, the students observed the dynamics of scientific work and conducted experiments guided by the research staff, gaining an immersive educational experience. The day concluded with an interactive competition in the form of a Kahoot quiz, where attendees could demonstrate what they had learned while competing for prizes, thus reinforcing the knowledge acquired in a fun way.

In parallel, CINTECX has maintained its commitment to promoting scientific and technological vocations through initiatives like STEMBach. This program, focused on inspiring younger generations toward scientific and technological research, included practical workshops, demonstrations, and informative talks. These activities created a dynamic and participatory environment where both researchers and students shared experiences and knowledge. The wide dissemination of this initiative through social media, digital platforms, and the *Diario de la Universidade de Vigo* reflected the centre's ability to connect with a broader audience and highlight the importance of science in society.

As part of its mission to strengthen the relationship between science and different sectors of society, CINTECX organized activities aimed at diverse audiences on April 26. A notable example was the open day targeted at families belonging to the Inventiva Association for children with high abilities. These actions have been part of a strategic effort to establish a deeper and more ethical dialogue between science and society, fostering mutual commitment and understanding of the role of research in social development.

As part of this approach, CINTECX has worked on designing a comprehensive scientific outreach plan that includes a variety of activities aimed at broad and specific audiences to be implemented in the coming years.

In the area of promoting scientific culture at the national level, CINTECX presented the "Alerta Verde CINTECX" project to the FECYT grants for the Promotion of Scientific, Technological, and Innovative Culture 2024. This immersive educational initiative, developed with the support of the consulting firm CEO-aberto, is aimed at pre-university students and seeks to raise awareness and train them in renewable energies, sustainability, and circular economy. Through practical challenges, participants will apply advanced technologies of the centre such as drones, ground-penetrating radars, and 3D printers to identify and solve environmental problems in their educational environment.

In addition, the project includes the creation of a website dedicated to citizen science initiatives, the organization of results presentation days, a traveling exhibition, and the development of the "Alerta Verde Toolbox," a set of accessible resources aimed at a diverse audience.

CINTECX's collaboration on other initiatives

CINTECX has consolidated its presence in various events, standing out in scientific outreach activities, industrial technology meetings, and international conferences. These initiatives reinforce its role as a key centre for knowledge transfer and the promotion of scientific culture in Galicia.

One of the most notable participations was CINTECX's presence at Navalia, a leading event in the naval sector, where the centre shared a booth with other research institutes from the Universidade de Vigo (Figure 34.b). This participation allowed them to showcase the impact of their projects in technological areas and their relationship with industrial development. Furthermore, the centre is an active member of *A Ciencia que Vén*, a scientific outreach fair organized by the Universidade de Vigo (Figure 34.c). On this occasion, CINTECX was represented by three booths where the research staff from the New Materials, GEOTECH, and BIOSUV groups exhibited their progress and conducted interactive demonstrations aimed at students and the general public. These activities facilitated direct contact between the research community and citizens, helping to inspire scientific vocations among young people and highlighting the relevance of science in the technological and environmental fields.

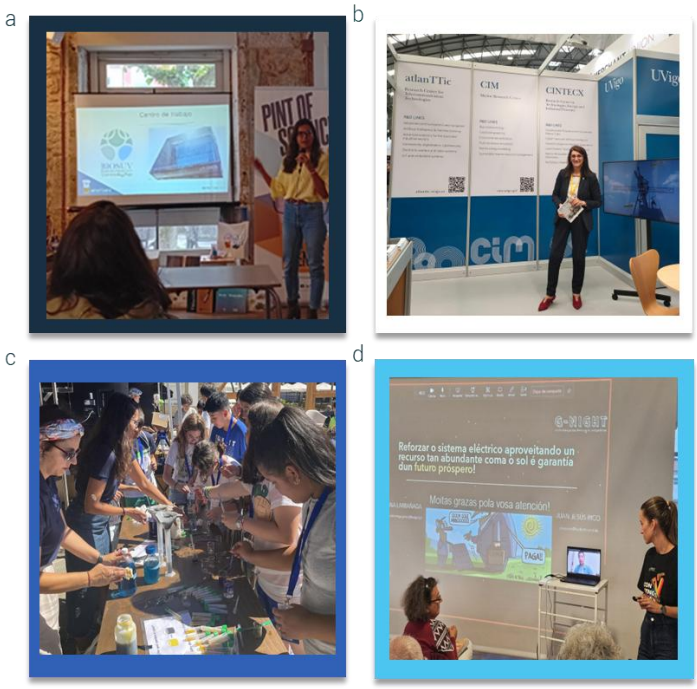

Figure 34. Several key events in which CINTECX participated in 2024: a. Presentation by researcher Aida Díez at the international festival Pint of Science; b. CINTECX's participation in the Navalia fair;

c. Participation of researchers at the "A Ciencia que Vén" fair;
d. Talk by researcher Ana Larrañaga at G-Night.

Another far-reaching initiative is CINTECX's regular participation in the international Pint of Science festival, an event that brings science to everyday spaces such as bars (Figure 34.a). During the 2024 edition, researchers from the center presented projects in areas such as energy transition, innovative water treatment, artificial intelligence, and the efficient use of thermal energy. The dissemination of these activities through social media and digital platforms allowed their impact to transcend the local level, reaching a broader audience and generating interest in the topics covered.

Since 2021, CINTECX has also actively participated in the *Noite Galega das Persoas Investigadoras* (G-Night), an annual event that brings together the Galician scientific community to share knowledge and experiences with society.

The 2024 edition of G-Night marked a milestone in CINTECX's participation. Under the motto "Creative Consciousnesses," the event was held in seven Galician cities and featured a significant contribution from the centre, which offered workshops, booths, and interactive activities for all audiences. Among these initiatives, the BIOSUV group presented a workshop on innovative solutions for removing contaminants from water, while the GTE group gave a talk on the energy transition in Spain, based on an article published in The Conversation (Figure 34.d). These activities not only helped bring scientific research closer to the public but also fostered a space for dialogue between researchers and the audience, promoting scientific culture and strengthening the relationship between science and society.

Through these multiple participations, CINTECX has demonstrated a strong commitment to scientific outreach and knowledge transfer.

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