

*Una manera de hacer Europa*



# BUENAS PRÁCTICAS

## Actuaciones Cofinanciadas

Correlative electron cryomicroscopy system for the Spanish National Biotechnology Center

Consejo Superior de Investigaciones Científicas (CSIC)

**Programa Operativo  
Plurirregional de España**

Año 2022

**Fondo Europeo de Desarrollo Regional**

## Correlative electron cryomicroscopy system for the Centro Nacional de Biotecnología del Consejo Superior de Investigaciones Científicas (Spanish National Biotechnology Center of the Spanish National Research Council)

The research activity of the Consejo Superior de Investigaciones Científicas (CSIC) is carried out through its own centers, institutes and units or in collaboration with other entities. One of these centers is the National Biotechnology Center (CNB) of the CSIC based in Madrid (CNB-CSIC). The CNB stands out for its versatile and interdisciplinary research, combining molecular biology techniques with the latest technologies in the field of functional and structural biology. The CNB has been recognized by an international jury as one of the eight "Severo Ochoa" Centers of Excellence in the area of Life Sciences and Medicine.

In addition, the CNB hosts the software production and application node for cryo-electron microscopy image processing of the international infrastructure INSTRUCT-ERIC, the so-called I2PC (Instruct Imaging Processing Center). INSTRUCT-ERIC is an Infrastructure of the European Strategic Forum for Research Infrastructures (ESFRI) in the area of health and food. Spain is part of this international consortium as a full member since September 2018.

The object of this project is the acquisition, installation and commissioning of a correlative cryo-electron cryomicroscopy system for the CNB-CSIC. The overall budget of the project was 8,000,000 euros, of which FEDER contributes 4,000,000 euros from the funds allocated the General Secretariat for Research, from the Pluri-regional Operational Program of Spain 2014-2020 for Spanish participation in large international scientific and technological infrastructures (ESFRI). This funding has been articulated through a collaboration agreement between the Ministry of Science and Innovation (MCIN) and the CSIC signed on May 12, 2020.

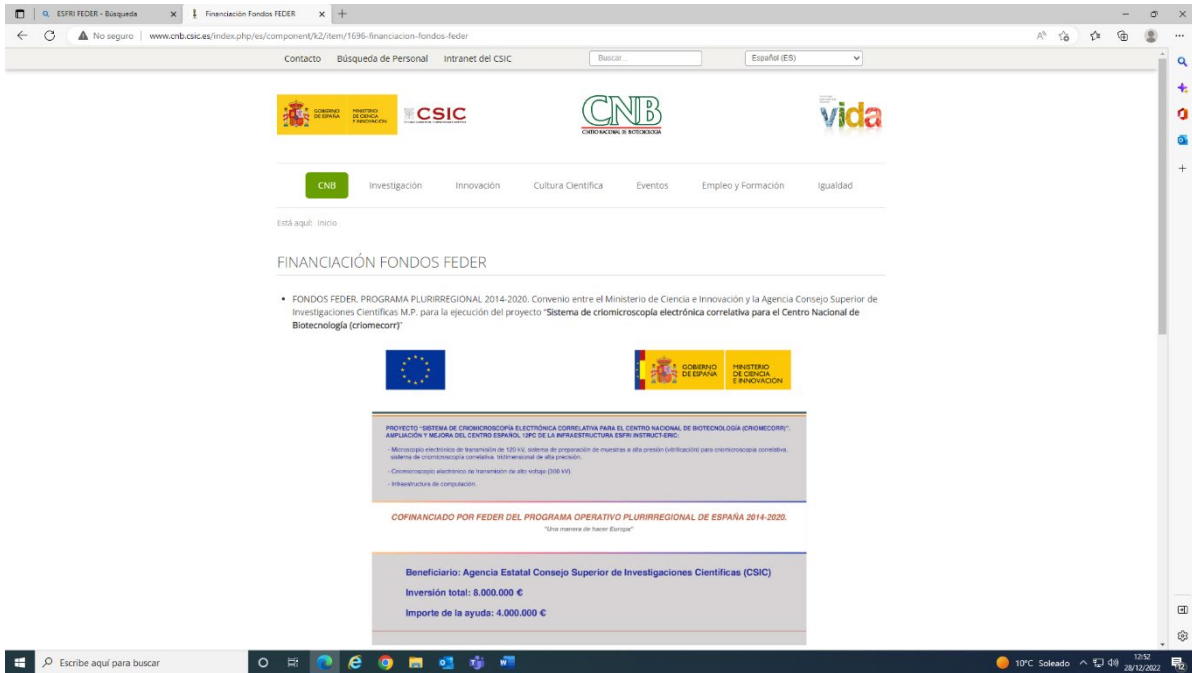
It is considered a good practice because it meets the criteria designed for this purpose:

1. **High outreach to beneficiaries and the general public**
2. The website of the Ministry of Science and Innovation (MCIN) contains all the information on ERDF co-financing accessible to both beneficiaries and the general public: [FEDER: Infraestructuras Científicas y Técnicas Singulares \(ICTS\) \(ciencia.gob.es\)](https://www.ciencia.gob.es/Infraestructuras-Cientificas-y-Tecnicas-Internacionales-ESFRI-FEDER.html)

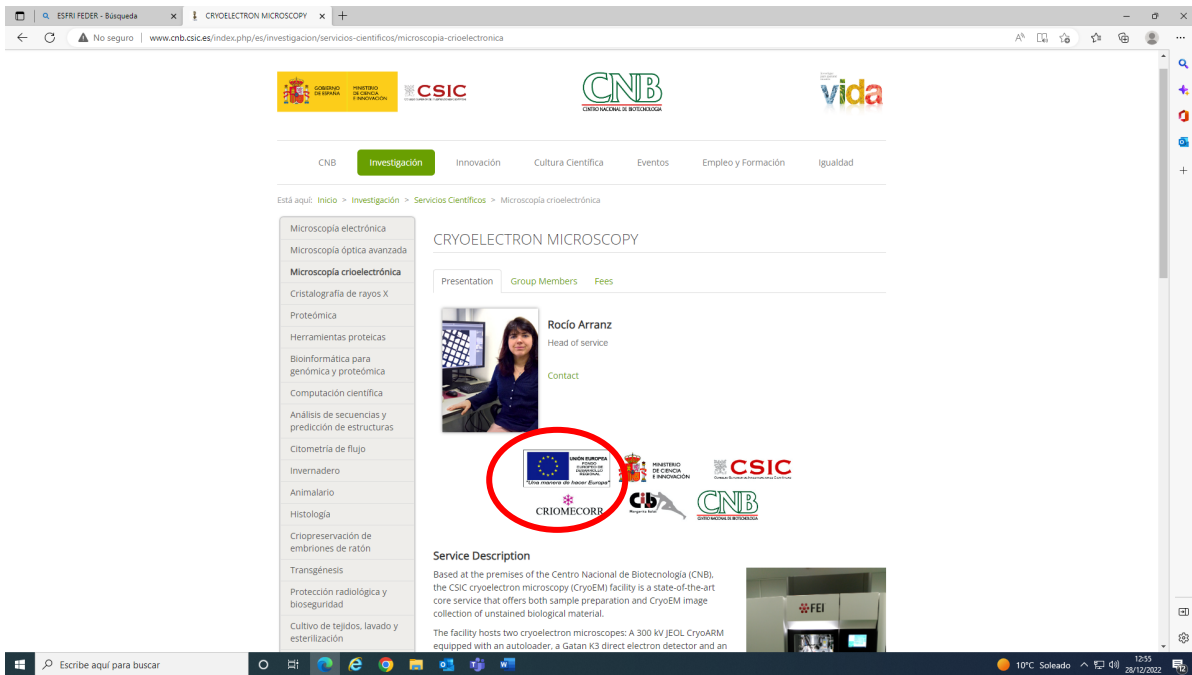
The screenshot shows a web browser window displaying the website for 'FEDER: Grandes Infraestructuras Científicas y Tecnológicas Internacionales (ESFRI)'. The page features the Spanish Ministry of Science and Innovation logo at the top left and the European Union flag at the top right. The main heading is 'FEDER: Grandes Infraestructuras Científicas y Tecnológicas Internacionales (ESFRI)'. Below this, the slogan 'Una manera de hacer europa' is prominently displayed and circled in red. To the right of the slogan, the European Union flag is also circled in red. The page includes a 'CERRADA' (Closed) status indicator and a detailed description of the project, including the year (2014), the operational program (Pluriregional de España (POPE) 2014-2020), the priority axis (Potenciar la investigación, el desarrollo tecnológico y la innovación), the specific objective (Fortalecimiento de las instituciones de I+D y creación, consolidación y mejora de las infraestructuras científicas y tecnológicas), and the line of action (Participación española en grandes infraestructuras científicas y tecnológicas internacionales (ESFRI)).

ELCNB-CSIC includes on its web page images accrediting the aid received from the European Regional Development Fund:

[Financiación Fondos FEDER \(csic.es\)](#)

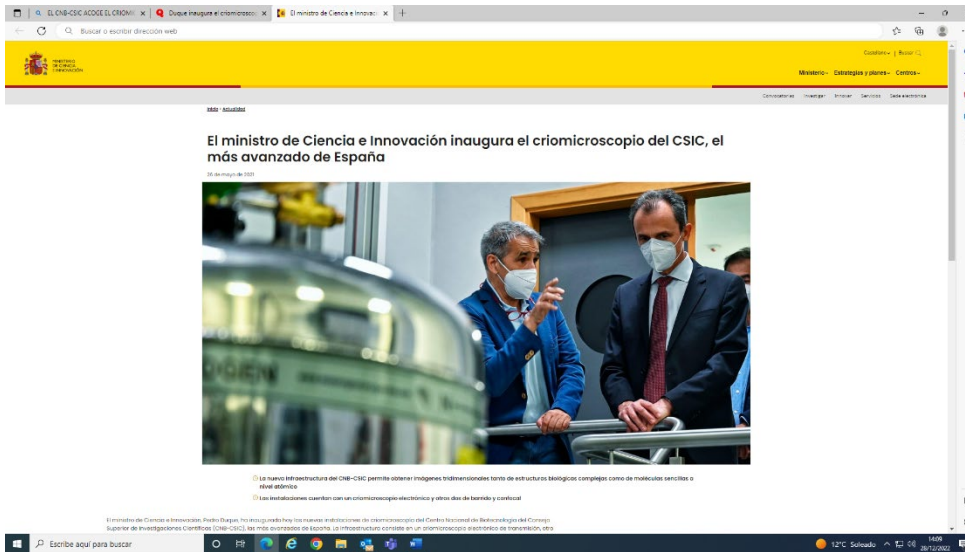


[CRYOELECTRON MICROSCOPY \(csic.es\)](#)

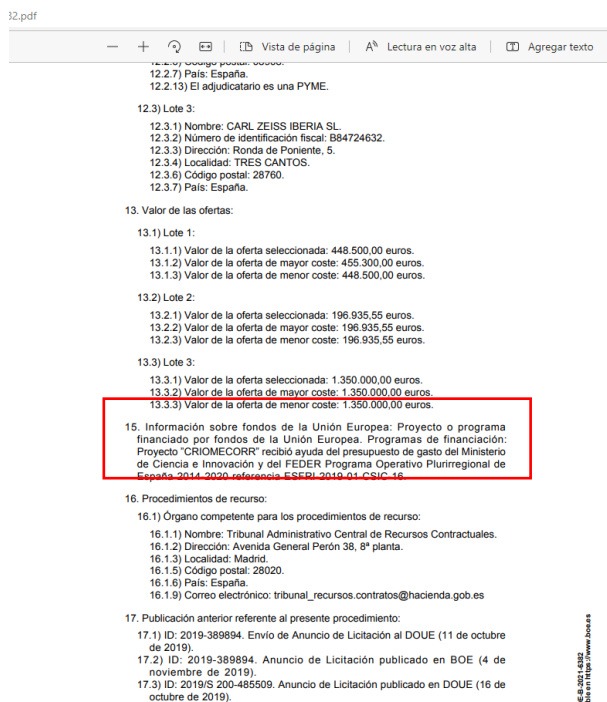


The Ministry of Science and Innovation reported on its website the attendance of the Minister Pedro Duque to the inauguration of the cryomicroscope at the CSIC. This news item includes information

on the ERDF co-financing of this infrastructure, which was also published on La Moncloa's website, and had repercussions in various news media, such as Europapress:



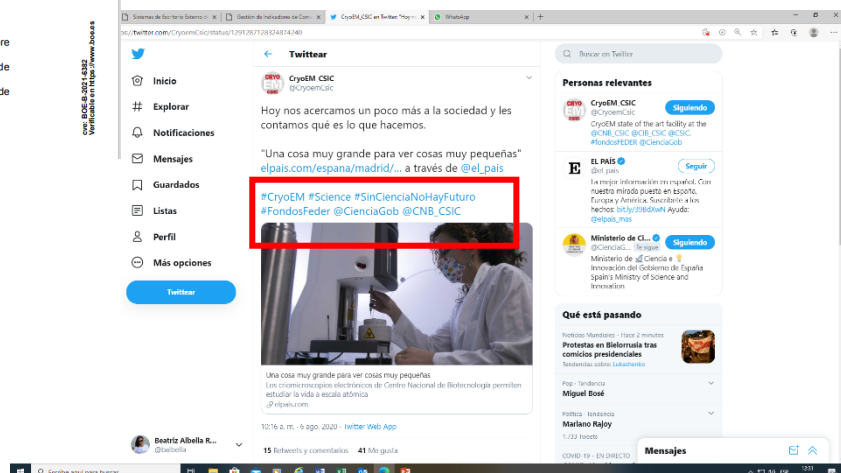
[El ministro de Ciencia e Innovación inaugura el criomicroscopio del CSIC, el más avanzado de España](#)



All procurement documents contain information on ERDF co-financing, for example : [Anuncio 6382 del BOE núm. 37 de 2021](#)

Also through social networks (Twitter) the CNB-CSIC has disseminated this ERDF co-financing with the hashtag #fondosFEDER:

<https://twitter.com/CryoemCsic/status/1291287128324874240?s=20&t=1WYRbDHOHTVi2gXYbNHKoA>



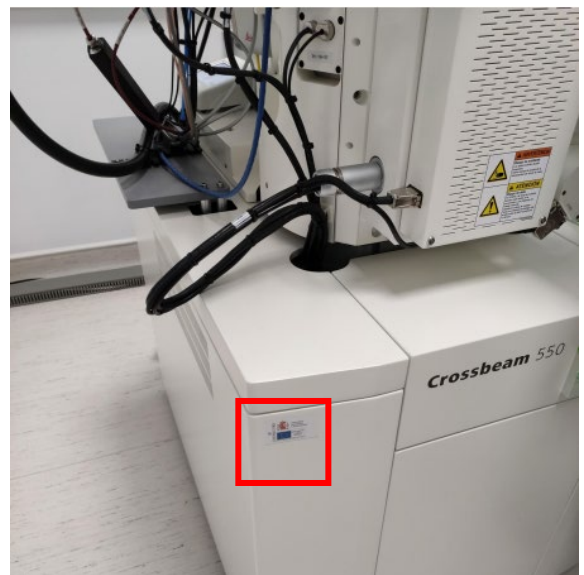
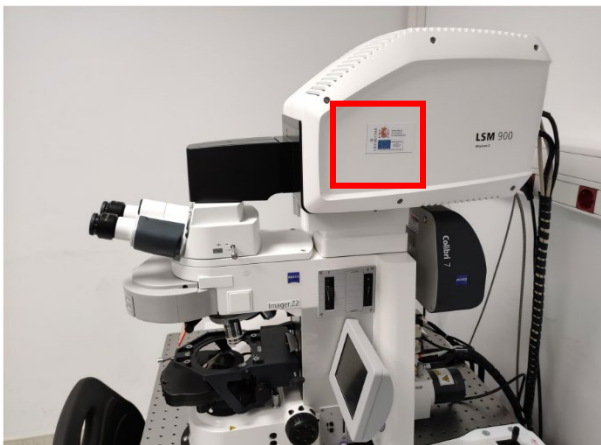


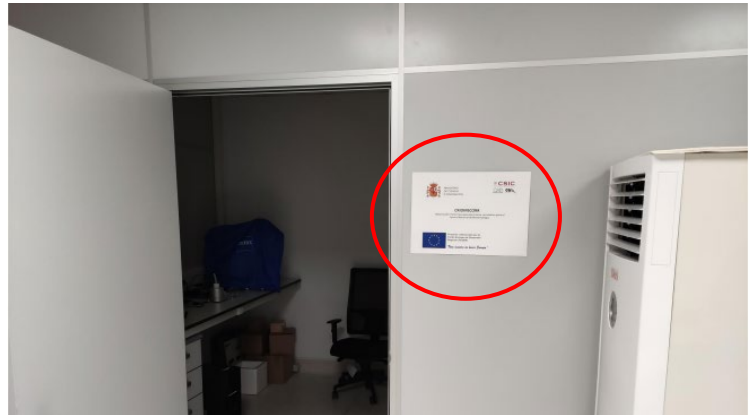


The CNB and CSIC web site published a news item on the project, with mention of its ERDF co-funding, which had great repercussion in the media.:

[El CSIC acoge el crio-microscopio electrónico más avanzado](#)

Labels have been placed on the equipment and plaques have been placed on the facilities that house them with the graphic elements of the ERDF co-financing:





## **2. The project includes innovative elements**

This project has made possible the installation in Spain of the first high-voltage electronic cryomicroscope. Cryo-electron microscopy has undergone a technological revolution in the last decade that has put it at the forefront of structural biology in its molecular and cellular aspects. This technology has been and still is within the reach of few laboratories. The lack of this technology in our country has hindered the growth of its scientific community in this field, delaying its development, something that is beginning to be solved with the execution of this Project

## **3. Adequacy of the results obtained to the established objectives**

The operation consisted of the acquisition, installation and commissioning of a correlative electron cryomicroscopy system including several pieces of equipment, the main one being a high voltage (300 kV) transmission electron cryomicroscope. The objective has been fully achieved, since the installation del microscopio se inauguró oficialmente el 26 mayo de 2021 y ya está en pleno funcionamiento.

## **4. Contribution to the resolution of a problem or weakness detected in the territorial scope of execution**

Electron cryomicroscopy is a state-of-the-art technique to observe cells with an unprecedented level of detail. The electronic cryomicroscope, called JEOL CryoARM 300, is the most advanced in Spain, its installation at CNB-CSIC, allows access in the best possible conditions to all Spanish groups that demand this technology (at this very moment, more than 50). In addition, its inclusion in INSTRUCT (European Structural Biology Infrastructure Instruct-ERIC), will make this initiative very visible to the international community. The complementation of the activities derived from its activity, complemented with those of the image processing service I2PC ("Instruct Image Processing Center"), the reference center for the production and application of image processing software of INSTRUCT, also located at CNB-CSIC, will multiply the worldwide visibility of the science generated.

The location of the CNB-CSIC in the Campus of International Excellence CSIC+UAM (Autonomous University of Madrid) and in the vicinity of the Madrid Technology Park facilitates contact between

public and private research groups in the area, also seeking synergies and more efficient implementation with R&D&I policies and funding at regional, state and European level..

#### **5. High degree of coverage of the target population**

The development of this advanced correlative electron cryomicroscopy system will allow Spanish researchers in the field to be at the forefront of structural biology research, enabling them to determine the structure of biological molecules at the highest resolution currently possible, even at the atomic level. Researchers, technologists and the entire related industry will therefore be the first sector of the population directly affected by this project. In 2021, 683 services were performed, of which 632 were to national groups and 51 to international groups.

The results of the research carried out in the infrastructures acquired in this project will ultimately benefit the welfare of society in general, since they will provide solutions to social challenges as important as those related to health. In this sense, relevant fields are the development of new drugs, the study of mechanisms of action of widespread diseases (such as cancer and neurodegenerative diseases) and rare diseases. In fact, this infrastructure has already joined the joint fight against the Covid-19 pandemic in several high-priority projects on the SARS-CoV-2 coronavirus.

#### **6. Consideration of horizontal criteria of equal opportunity and non-discrimination, as well as social responsibility and environmental sustainability**

In 2002, the CSIC began to develop equality strategies with the creation of the Women and Science Commission, whose mission is to advise the CSIC Presidency and to study, monitor and optimize the scientific careers of women in the organization. This commission is a pioneer in this field in the Spanish General Administration. The CSIC also has a Delegate Commission for Equality. The objective of this body is to carry out a diagnosis of the situation of gender equality in the institution and propose actions in this area, it is also responsible for the development of the Plan for Equality between women and men in the CSIC.

As a social responsibility within its scientific activities, the CNB-CSIC collaborates with various educational centers and organizations, bringing the scientific knowledge generated at the center to schools, institutes and universities. To this end, they participate and organize visits, conferences and activities aimed at students or their teachers. In addition, it has several outreach channels for society in general covering all age ranges: blog, twitter, LinkedIn, Facebook and Youtube.

#### **7. Synergies with other public intervention policies or instruments**

This project will put the CNB-CSIC at the forefront of the global electron cryomicroscopy infrastructure and will multiply all its indicators: national and international R&D&i projects, scientific publications, user access, researchers, etc. The attraction of more scientific and industrial users that will contribute to increasing the synergy with the instruments they have to finance the R&D&i projects under study on the cryomicroscopy platform of the CNB-CSIC. On the other hand, synergies are planned with national and regional financing instruments for the hiring of research and technical personnel necessary for the operation of this complex, cutting-edge infrastructure. In fact, a position for a Higher Graduate specialized in the management of part of the infrastructure (correlative cryomicroscopy) and another support technician have already been obtained thanks to a project to support the Antivirals platform, recently created at the CSIC.

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At the European level, given the relevant role of the CNB-CSIC in INSTRUCT-ERIC (European Research Infrastructure Consortium) as a node specialized in image processing techniques, the incorporation of the cryomicroscopy system will allow it to develop its work program with its own

resources, reinforce its role in this distributed pan-European structural biology research network and establish synergies with all the instruments available in this consortium



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