

New electron microscope centre to advance in research into structural biology and new materials

- **This cutting-edge facility will house two high-end electron microscopes: one to determine the structure of large protein complexes and another to study materials at atomic level.**
- **Created thanks to the joint effort of several research institutes, the centre is located at the ALBA Synchrotron and will be open to the entire scientific community.**
- **Catalan Research and Universities Minister Joaquim Nadal inaugurates the centre, which has received funding from the Catalan Government's ERDF programme, on 24 February.**

The Joint Electron Microscopy Center at ALBA (JEMCA) was created thanks to the collaboration of different research entities to launch a new centre within the ALBA Synchrotron building offering electron microscope services to the scientific community. In specific, eight different partners will be using this centre: the Institute for Molecular Biology of Barcelona (IBMB-CSIC), the Catalan Institute for Nanoscience and Nanotechnology (ICN2), the Institute for Biomedical Research (IRB Barcelona), the Centre for Genome Regulation (CRG), the Institute for Materials Science of Barcelona (ICMAB-CSIC), the Spanish National Research Council (CSIC), the Universitat Autònoma de Barcelona (UAB), and the ALBA Synchrotron. The project definition phase also included the fundamental support of the Barcelona Institute of Science and Technology (BIST).

This is the only facility in all of Spain that allows working with tools that are complementary to the synchrotron light source with the aim of gathering more information in the field of structural biology and materials science.

The centre currently houses two microscopes: the Cryo-TEM, coordinated by the Institute for Molecular Biology of Barcelona (IBMB-CSIC), and the METCAM, coordinated by the Catalan Institute for Nanoscience and Nanotechnology (ICN2).

The Cryo-TEM microscope is key to being able to solve rapidly and with high resolution the protein structures that cannot be analysed with other techniques. This microscope is already being put to use in experiments with an elevated social return. For example, IBMB-CSIC researchers Núria Verdaguer and Pablo Guerra, in collaboration with IRB Barcelona researchers Manuel Palacín and David Aparicio and the spin-off Ona Therapeutics, are analysing a protein involved in

metastatic lung cancer as well as the protein's complex with an antibody of interest for a therapy that targets metastases. The Cryo-TEM is the second microscope of its kind in Spain and represents a great advance for the user community in this field.

The METCAM microscope, which is currently being set up, is unique in Spain. It will be used to analyse different types of materials. Its extremely high spatial resolution reaches below 0.5 angstroms (one angstrom is ten million times smaller than one millimetre), which allows viewing atoms individually. It should also be noted that with this equipment it will be possible to correlate the data obtained with the synchrotron light techniques carried out in the same area. This makes it easier to tackle challenges such as hydrogen production, CO₂ reduction and the development of quantum materials from different perspectives. For example, the team of ICREA lecturer Jordi Arbiol, group leader at ICN2, is carrying out several projects to develop scalable quantum bits for quantum computing from hybrid nanostructured materials, one of them in collaboration with Microsoft. In addition to the two microscopes, in order to prepare the samples in very thin films and observe them at METCAM, the centre has a focused ion beam (FIB) instrument, installed at the ICN2. The METCAM will host its first experiments in April.

These new microscopes are open to the entire scientific community. Academic access is free of charge on a competitive basis, as is the case with the rest of the equipment at the ALBA Synchrotron. Members of the project have a reserved time of use.

The cost of the microscopes rises to a total of 5.8 million euros. Fifty percent of this amount was financed by the European Regional Development Fund (ERDF), with the support of the Ministry for Research and Universities of the Government of Catalonia, through the aid for the implementation of cooperative projects for the creation, construction, acquisition and improvement of shared scientific and technological equipment and platforms, under the framework of the ERDF Operational Programme for Catalonia 2014-2020.

The JEMCA thus expands research capacities in Catalonia, which will also be strengthened by the electron microscope co-funded by the same ERDF programme and currently being installed at the University of Barcelona. Furthermore, through the ICN2, JEMCA forms part of the European Distributed Research Infrastructure for Advanced Electron Microscopy (e-DREAM).

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