

ICMAB secures funding for two EIC Pathfinder projects on energy storage and cancer treatment

Researchers Ashley Black and Pablo Guardia will lead ICMAB's contributions to two European projects exploring adaptive battery materials and nanotechnology-based treatments for solid tumours



These two EIC Pathfinders will help explore both new battery designs and new a new strategy against cancer | Edit by ICMAB, original pictures by Vardan Papikyan and National Cancer Institute [via Unsplash]

Two researchers from the Institute of Materials Science of Barcelona (ICMAB-CSIC) have been selected for funding under the European Innovation Council (EIC) Pathfinder Open 2026 programme. The projects, IONFLUX and MitoNano, will explore new approaches to energy storage and cancer treatment, respectively, with ICMAB researchers Ashley Black and Pablo Guardia leading the Institute's contributions.

The EIC Pathfinder programme, part of Horizon Europe, promotes interdisciplinary collaborations focused on early-stage technology development. These projects are high risk, yet high reward, with the potential to lead to significant scientific and technological advances. Both projects bring together European research institutions and industrial partners to investigate concepts that could form the basis of future technological developments.

IONFLUX: Exploring adaptive materials for a new generation of batteries

The IONFLUX (Adaptive Electrochemical Matter Based on Self-Reconfiguring Liquid Systems) project explores an unconventional idea in battery science. Traditionally, scientist have tried to design battery materials that remain as stable as possible during operation, preventing structural and chemical transformations that may lead to degradation. Instead, IONFLUX proposes investigating almost the opposite approach: whether some of these transformations could actually be exploited to create electrochemical materials capable of adapting dynamically to their operating conditions

The project will investigate a sodium-based battery operating at approximately 150 °C. Researchers will study whether bismuth nanoclusters can form, reorganise and dissolve reversibly within the molten catholyte, potentially modifying the interface with the solid electrolyte and improving its electrochemical behaviour.

At ICMAB-CSIC, researcher Ashley Black will lead the work package dedicated to operando multi-technique characterisation of adaptive interfaces. The team will use advanced synchrotron X-ray techniques to observe these processes while the battery is operating, building on ICMAB's collaboration with the ALBA Synchrotron.

Coordinated by the Consiglio Nazionale delle Ricerche (CNR-ITAE) in Italy, IONFLUX brings together eight European partners over four years. If the proposed mechanisms can be demonstrated, the project could establish the foundations for a new class of adaptive electrochemical materials.

MitoNano: Targeting cancer cell metabolism with nanotechnology

The MitoNano (Targeted Mitochondrial Inhibition as a Universal Nanotherapeutic Paradigm for Solid Tumors) project aims to develop a therapeutic strategy for aggressive and treatment-resistant solid tumours. It combines a nanoplatform targeting mitochondria with externally controlled hyperthermia to selectively disrupt energy production in cancer cells.

The project focuses on mitochondrial Complex I, a key component of the energy production process on which certain cancer cells depend. Although inhibiting this complex has shown promising anticancer activity, its clinical application remains limited by systemic toxicity and low selectivity. MitoNano will develop polymeric nanocapsules or hybrid nanobeads to deliver inhibitors directly to cancer cell mitochondria, with controlled drug release triggered by magnetic or photothermal heating.

At ICMAB-CSIC, the project will be led by researcher Pablo Guardia, with the participation of Anna Laromaine and Juan Pellico. The consortium will combine expertise in cancer metabolism, nanotechnology, advanced imaging and hyperthermia to evaluate the approach in tumour cell models and preclinical studies.

MitoNano is coordinated by the University of Salento in Italy and brings together six partners from Italy, Spain, Germany and Norway. The project aims to establish a more selective approach to treating solid tumours while reducing the toxicity associated with mitochondrial inhibition.