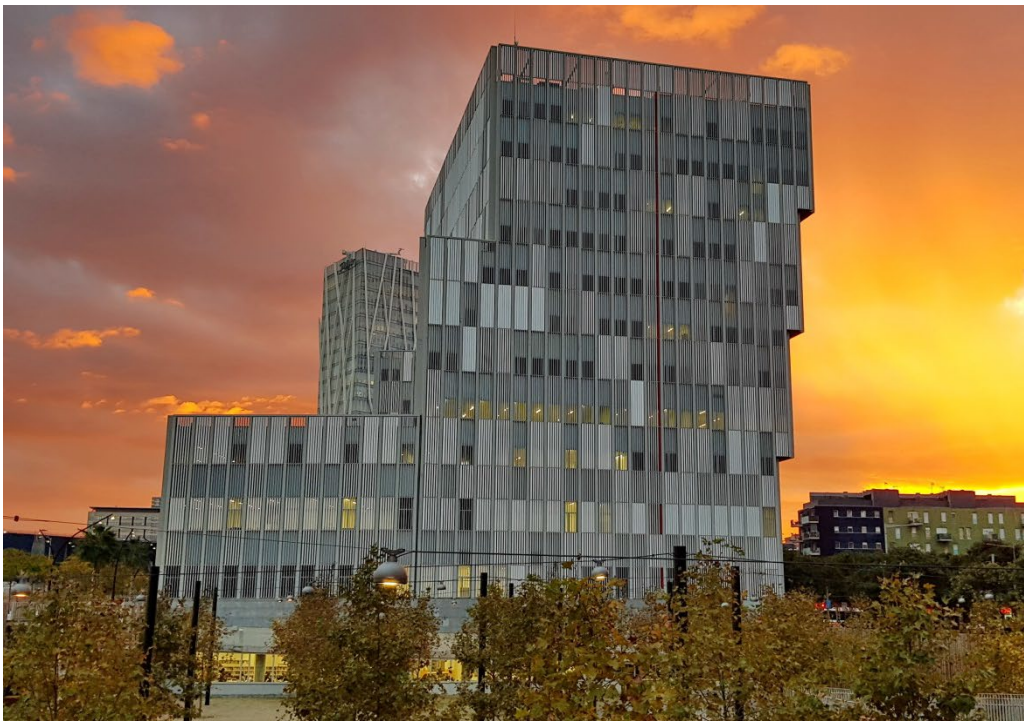


CAMPUS DIAGONAL -BESÒS

Research Newsletter

Winter 2024

FOREWORD

Campus Diagonal-Besòs

The benefits of scientific dissemination

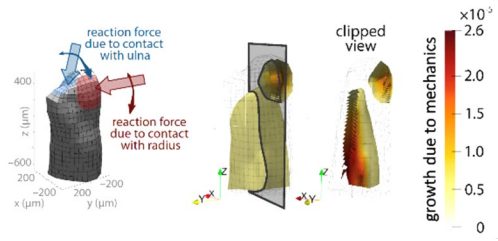
If Science is the torch that guides us through the dark, mysterious universe, **dissemination activities** are the spark that ignites its flame. As a key component in the training of future engineers and scientists, dissemination fosters a deeper understanding of scientific principles, reinforcing knowledge and cultivating critical thinking.

It promotes innovation and creativity. Exposure to recent advancements in other fields provides future engineers and scientists with fresh perspectives and ideas, driving interdisciplinary breakthroughs. Moreover, understanding the broader implications of their work encourages them to integrate sustainability, safety, and ethical considerations into their designs.

All in all, scientific dissemination plays a crucial role in preparing students to become effective, knowledgeable, and socially responsible professionals. To support this mission, the **Campus Diagonal-Besòs** (CDB) regularly organizes various dissemination activities, including *Science and Cinema* forums (Page 5), *Research Beers*—informal meetings between students and researchers (Page 7)—and *Sciencescapes*, a video series where researchers showcase the science conducted at CDB.

Welcome to the Campus Diagonal-Besòs, where future's science and technology is being forged.

IN THIS ISSUE



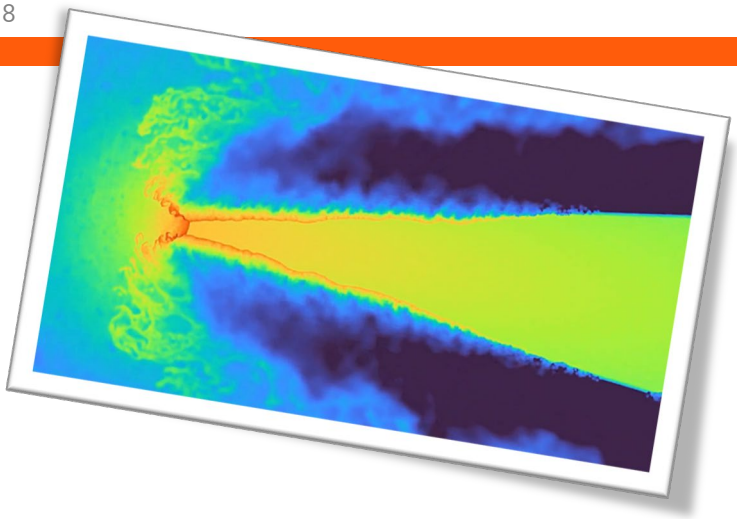
Research Bites

A selection of high-impact articles, among those published by CDB researchers during the **second semester of 2022,** in areas such as *materials science, biology, pharmaceutical science,* and *industrial, mechanical, electrical and environmental engineering,* is displayed on Pages 2-3. An overview of one of the CDB research groups, **MOMA**, is presented on Page 4. These snapshots show the rich and diverse research landscape that characterize the Campus.

News & Events

Funding opportunities, new research facilities and grants, past and future events, and research awards given to CDB researchers, can be found on Pages 8 - 10.

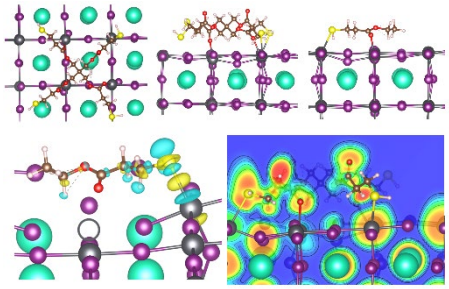
Research Highlights



IMPROVING THE EFFICIENCY OF PEROVSKITE SOLAR CELLS

J. Guo, J. Sun, L. Hu, S. Fang, X. Ling, X. Zhang, Y. Wang, H. Huang, C. Han, **C. Cazorla**, Y. Yang, D. Chu, T. Wu, J. Yuan & W. Ma, "Indigo: A Natural Molecular Passivator for Efficient Perovskite Solar Cells", ***Advanced Energy Materials*** *12*, 2200537 (2022) [*Q1, 11/1441 in Materials Science; IF=27.8*]

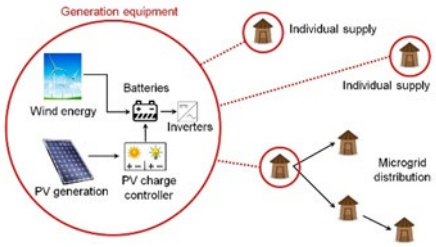
Organic–inorganic hybrid lead halide perovskite solar cells have seen major efficiency gains but struggle with stability. This study, with participation of a **GCM/CCQM** researcher (**Group of Characterization of Materials/Condensed, Complex and Quantum Matter group**), explores using the natural organic dye Indigo as a molecular passivator to improve perovskite film quality and stability. Indigo's carbonyl and amino groups provide chemical passivation, reducing defects. Theoretical and experimental data show Indigo enhances crystallization, increases grain size, improves uniformity, and reduces defects, boosting efficiency to 23%, and ≈21% for larger devices (1 cm^2). Additionally, Indigo passivation improves stability against humidity and heat, offering a cost-effective method to enhance perovskite films for optoelectronics.



NEW STRATEGIES IN THE DESIGN OF ELECTRIFICATION SYSTEMS

Ponsich, B. Domenech, L. Ferrer-Martí, M. Juanpera & R. Pastor, "A multi-objective optimization approach for the design of stand-alone electrification systems based on renewable energies", ***Expert Systems with Applications*** 199, 116939 (2022) [*Q1, 182/3278 in Engineering; IF=8.5*]

Generally, the design of stand-alone systems based on renewable energies only considers economic efficiency, minimizing the cost for a given demand. However, distinct solutions covering different demands (and so different costs) should be helpful to allow users to select the one that best fits their needs and budget.



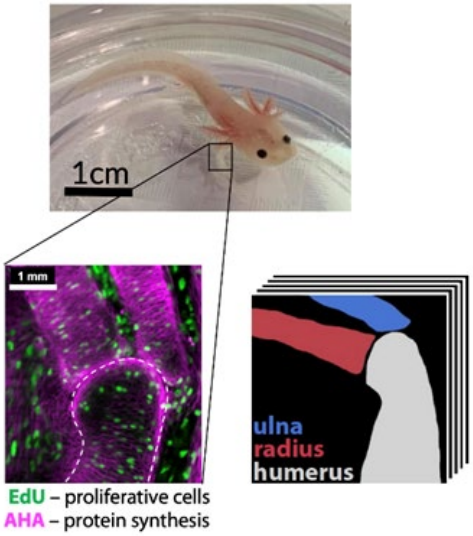
This work, conducted by researchers of the **Design and Optimization of Processes and Services** group **(DOPS)**, introduces a strategy based on Multi-objective Optimization (MO), aiming to produce a comprehensive set of configurations that represent the best trade-off between the cost and the demand supplied to consumers.

The process developed first identifies a set of non-dominated solutions and, if necessary, prunes it through mechanisms based on Evolutionary MO to obtain a manageable number of efficient solutions. The working parameters and internal operators are finely tuned and designed through the numerical comparison of several pruning techniques.

STIMULATING TISSUE GROWTH IN SALAMANDERS

E. Comellas, J.E. Farkas, G. Kleinberg, K. Lloyd, T. Mueller, T.J. Duerr, **J.J. Muñoz**, J.R. Monaghan & S.J. Shefelbine, "Local mechanical stimuli correlate with tissue growth in axolotl salamander joint morphogenesis", ***Proceedings of the Royal Society B*** *289*, 20220621, (2022) [*Q1, 104/2461 in Agricultural and Biological Sciences; IF=4.7*]

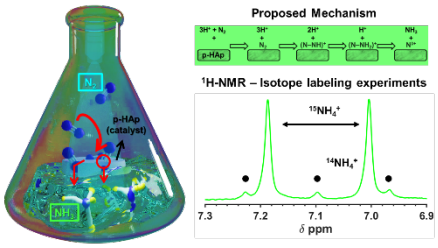
This study explores how physical forces from movement influence the shaping of skeletal joints through a combined experimental and computational approach. An international team, that included researchers of the group on **Numerical Methods for Applied Sciences and Engineering (LaCàN)**, examined regenerating forelimbs in axolotl salamanders, comparing normal regrowth to regrowth treated with a substance affecting cell sensitivity to mechanical cues. By examining the shape and growth of bones in the regrown limbs, they found that altering cell mechanosensitivity led to noticeable changes in joint shape and cell growth. A poroelastic computational model was also developed to simulate bone growth by combining biological and mechanical factors. The model's predictions matched the experimental results, suggesting that pressure derived from limb movement promotes tissue growth. This research helps us understand how mechanical forces influence joint formation, offering insights for future medical research.



ON THE CATALYTIC CONVERSION OF DINITROGEN INTO AMMONIUM

J. Sans, M. Arnau, V. Sanz, P. Turon & **C. Alemán**, "Fine-tuning of polarized hydroxyapatite for the catalytic conversion of dinitrogen to ammonium under mild conditions", ***Chemical Engineering Journal*** 446, 137440 (2022) [*Q1, 7/382 in Industrial & Manufacturing Engineering; IF=15.1*]

The current industrial production of ammonia (NH_3) from N_2 and H_2 through the Haber-Bosch process (H-B) is responsible of the 1-2 % of the CO_2 global emissions. Due to its use as an essential compound for food sustains or as a potential energy carrier, a transition towards green and sustainable NH_3 production is necessary.



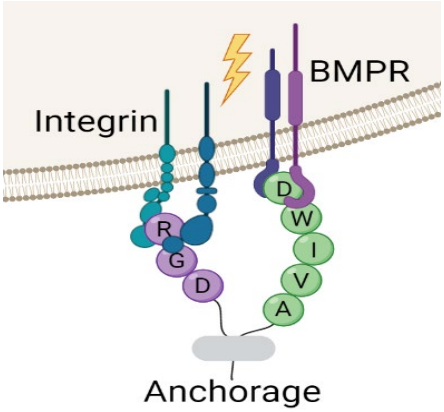
In this work, researchers of the **IMEM-BRT** group (**Innovation in Materials and Molecular Engineering - Biomaterials for Regenerative Therapies**) report on the use of a catalyst based on permanently polarized hydroxyapatite (p-HAp) capable of producing NH_3 from N_2 and water under mild (≤ 120 ºC and ≤ 6 bar) reaction conditions. The reaction presents remarkable advantages related with the sustainable and green recycling of polluted air: 1) p-HAp is a green and abundant catalyst capable of producing NH_3 from N_2 and converting CO_2 into value-added chemical products simultaneously; and 2) The reaction is carried out without applying external electrical fields, resulting in a much favorable energy balance.

NEW APPROACHES IN BONE REGENERATION

Ll. Oliver-Cervelló, H. Martin-Gómez, N. Mandakhbayar, Y.W. Jo, E.A. Cavalcanti-Adam, H.W. Kim, **M.P. Ginebra,** J.H. Lee & **C. Mas-Moruno**. "Mimicking bone extracellular matrix: from BMP-2-derived sequences to osteogenic-multifunctional coatings", **Advanced Healthcare Materials** 11, 2201339 (2022) [*Q1, 3/190 in Pharmaceutical Science; IF=10.0*]

Reproducing the extracellular conditions that promote integrin and growth factor signaling is a major goal to trigger bone regeneration. In this work, researchers from the **Biomaterials, Biomechanics and Tissue Engineering** group (**BBT**) in collaboration with teams from the Max Planck Institute (Germany) and Dankook University (Korea) screened BMP-2 to identify peptides with osteogenic properties.

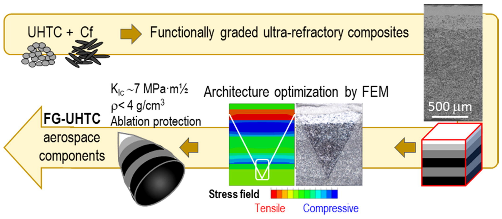
The most active sequences were combined with the cell adhesive RGD peptide to produce tailor-made biomimetic peptides presenting the bioactive cues in a chemically and geometrically defined manner. Such multifunctional peptides synergistically enhanced stem cell adhesion and differentiation. In vivo studies in rats proved the capacity of this strategy to improve new bone formation. These results highlight the potential of mimicking integrin-growth factor signaling with synthetic peptides.



ON THE STRUCTURAL INTEGRITY OF ULTRA-HIGH TEMPERATURE CERAMICS REINFORCED WITH CARBON FIBERS

L. Silvestroni, D. Pavan, C. Melandri, D. Sciti, N. Gilli, **L. Ortiz-Membrado, E. Jiménez-Piqué** & A. Mattia Grande, "Functionally graded ultra-high temperature ceramics: From thermo-elastic numerical analysis to damage tolerant composites", ***Materials and Design*** 224, 111379 (2022) [*Q1, 26/659 in Mechanical Engineering; IF=8.4*]

Ultra-high temperature ceramics (UHTCs) are attractive to the aerospace industry, due to their high melting points and thermal conductivity. However, the low fracture toughness and catastrophic fracture of these ceramics represents an obstacle to the widespread use of these materials. This limitation is improved in this work by developing functionally graded ZrB_2-SiC ceramics reinforced with short carbon fibers. Various architectures, including (AB)nA and complex asymmetric designs, were created using hot pressing to optimize mechanical properties and stress distribution.

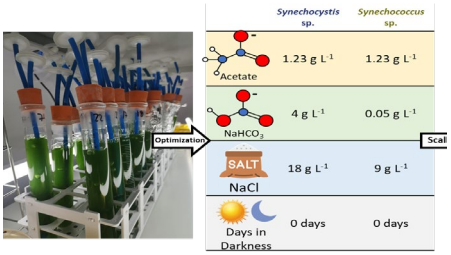


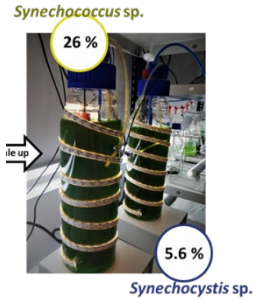
In this collaboration between **CIEFMA** (**Center for Research in Structural Integrity, Reliability and Micromechanics of Materials**) and CNR Italy, researchers have measured the micromechanical data in order to understand the structural integrity of these materials. Finite element models, refined with experimental nanoindentation data, were used to predict the stress distribution and to optimize the architecture design of this functionally graded UHTCs. At a density below 4 g/cm^3 fracture toughness at room temperature reached 7 MPa·m$^{1/2}$, increasing to 10 MPa·m$^{1/2}$ at 1500°C.

OPTIMIZATION OF POLYHYDROXY-BUTYRATE PRODUCTION IN CYANOBACTERIA

E. Rueda, B. Altamira-Algarra & **J. García,** "Process optimization of the polyhydroxybutyrate production in the cyanobacteria Synechocystis sp. and Synechococcus sp.", ***Bioresource Technology*** 356, 127330 (2022) [*Q1, 5/195 in Environmental Engineering; IF=11.4*]

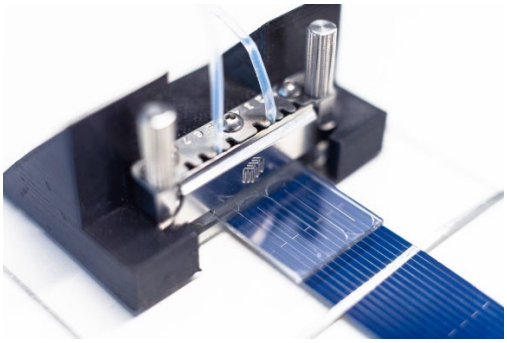
Cyanobacteria can produce bioplastics (PHB) using sunlight and CO_2. However, the cyanobacteria native PHB content is low. Therefore, to make this process feasible, optimization is required. It is well known that a deficiency of nutrients, especially nitrogen and phosphorus, stimulates the accumulation of PHB in cyanobacteria. However, to further increase the PHB accumulation, other strategies should be tried.





In this study, performed by researchers of the **Environmental Engineering and Microbiology** group (**GEMMA**), the effect of four parameters (acetate, NaCl, inorganic carbon and days in darkness) were tested and optimized for two cyanobacteria using Box-Behnken. A maximum of 26.1 $\%_{dcw}$ was reached by using 2 g L^{-1} of acetate, 4 gC L^{-1} of $NaHCO_3$, 18 g L^{-1} of NaCl and no darkness. These results provide an easy method to optimize cultivation conditions to enhance PHB production with cyanobacteria.

RESEARCH GROUPS



MOMA in a nutshell

MOMA is doing research related to molecular materials synthesis and investigation. The group develops new materials for energy storage, including so-called *molecular solar thermal systems* (MOST), where molecular photo-switches are used to capture solar energy. The group also develops new materials for photon upconversion–there are systems that convert long wavelength photons into shorter wavelength photons. Finally, the group conducts research as well in materials recycling and automated and accelerated discovery.

MOMA's RECENT RESEARCH HIGHLIGHT

Z. Wang, H. Hölzel, L. Fernandez, A. S. Aslam, P. Baronas, J. Orrego-Hernández, S. Ghasemi, M. Campoy-Quiles, & **K. Moth-Poulsen,** *Hybrid Solar Energy Device for Simultaneous Electric Power Generation and Molecular Solar Thermal Energy Storage"*, **Joule** 8, 2607 (2024)

MOMA's RESEARCH FAST FACTS

Source: https://futur.upc.edu/39851403
https://www.moth-poulsen.com

RESEARCH OUTPUTS

- 170 Research Papers in indexed journals
- 11 PhD Theses
- 4 Spin-off and startup companies

FUNDING & AWARDS

• 15 M€ in research funding, including a *Starting* (2013) and a *Consolidator* (2022) ERC grants from the European Research Council
• *Göran Gustafsson Prize*, Royal Swedish Academy of Science (2021)
• *Norblad-Ekstrand Medal*, Swedish Chemical Society (2020)
• *Arnbergska Prize*, Swedish Royal Academy of Science (2019)

FOR MORE INFORMATION

Prof. Kasper Moth-Poulsen,
kasper.moth-poulsen@upc.edu

RESEARCH GROUPS @ CDB

Molecular Materials Group (MOMA)

At present time, the main MOMA research lines are the following:

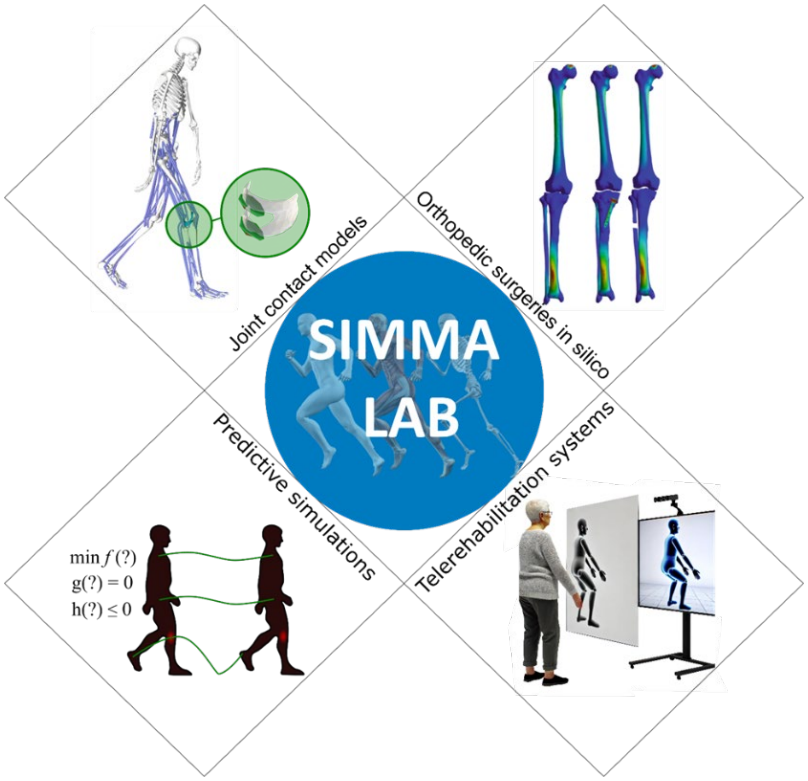
- Molecular photo switches for energy storage
- Photon upconversion materials through a process know as triplet triplet annihilation
- Materials recycling and green chemistry
- Accelerated discovery through the use of lab automation and robotics

WHAT/WHICH/HOW

WHAT is Biomechanics?

By Prof. Gil Serrancolí (InSup/LAM, Dept. Mechanical Engineering, EEBE-CDB)

Computational biomechanics studies the movement of human subjects and their underlying causes. At the *Simulation and Movement Analysis Lab* (**SIMMA Lab, EEBE**), we develop **musculoskeletal simulations** to predict kinematic and dynamic data simultaneously (such as muscle forces, ground reaction forces, and joint loading). These simulations involve the formulation of an optimal control problem, where we minimize physiological variables (such as muscle effort or metabolic cost) to perform a movement from one state to another. The novelty of our simulations lies in the incorporation of an efficient **mesh-based contact model** to predict joint pressures, a feature typically reserved for finite element method studies. Our goal is to study joint degeneration, a key determinant of osteoarthritis. In this regard, we are also analyzing **new orthopedic methods in silico** using finite element methods, in collaboration with a group of knee surgeons from ICATME and Hospital del Mar, Barcelona.



In parallel, we are developing a telerehabilitation system for individuals with chronic rehabilitation needs, in close collaboration with an association of individuals with movement impairments (Asociación Diversidad Funcional de Osona, ADFO). Overall, our ultimate goal is to improve the quality of life for patients by providing reliable and efficient tools to clinicians.

FURTHER READING ON BIOMECHANICS

Serrancolí, G., Falisse, A., Dembia, C., Vantilt, J., Tanghe, K., Lefeber, D., Jonkers, I., De Schutter, J., & De Groote, F., "Subject-exoskeleton contact model calibration leads to realistic interaction force predictions", ***IEEE Transactions on Neural Systems and Rehabilitation Engineering*** 27, 1597 (2019)

SCIENCE & CINEMA

The 7th edition of the **Science & Cinema** series took place in September 2022 at the CDB. This series dives into the scientific and technological wonders (and occasional blunders) found in relatively recent movies and TV shows.

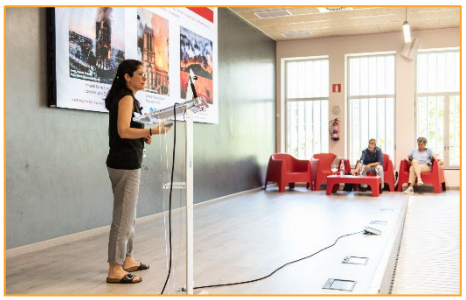
In this edition, **Prof. Emilio Jiménez** (CIEFMA-PROCOMAME) captivated the audience with a highly engaging talk titled **"Amazing Materials! Metallurgy and Material Sciences in The Lord of the Rings, Game of Thrones, and Other Fantasy Sagas."** From the unbreakable Valyrian steel to the mystery of mithril, the conference explored how real-world materials science stacks up against Hollywood magic. Because, let's be honest, if some of these metals actually existed, blacksmiths would be the true rulers of Middle-earth!

RESEARCH DAY

The **3rd edition** of the **Research Day**, the annual gathering where researchers and academics unite (and occasionally battle over the last coffee), took place on July 1st, 2022, at the Campus Diagonal-Besòs.

These annual meetings aim to inspire both young and *seasoned* researchers, provide a snapshot of the latest research efforts, and most importantly, spark new collaborations (and a few spirited debates!). It's a day of science, networking, and perhaps even the discovery of your next research partner, or a golden opportunity to meet someone who understands your niche field of study...

First launched in June 2019, the *Research Day* has been going strong ever since. The inaugural edition tackled "Multiscale Energy Systems: From Microcosmos to Macrocosmos", drawing in over 110 participants (and probably just as many questions). After the pandemic *intermission*, the 2021 edition took a bold turn with "Women, Men, and Machines: The Future of Mankind". The third edition set its sights on a greener future, diving into "Circular Economy, Environment, and Sustainability". After all, saving the planet is a team effort!



RESEARCH BEER

Three more installments of **Research Beer** took place at CDB during the second semester of 2022. This research initiative, launched in April 2022 and co-organized by **UPC's Libraries Unit and EEBE's Research Sub-directorate**, is all about making multi-disciplinary research and cutting-edge science accessible (with a a cold drink in hand).

Each session features two speakers from different research groups who provide an informal yet inspiring overview of their main research interests. Their goal is to spark curiosity and possibly motivate students to embark on research internships or even tackle a BSc or MSc thesis. Students are encouraged to sip on a beer or a soft drink while absorbing the latest scientific insights. At the end of each session, they can fire away with questions in a relaxed and engaging atmosphere.

The three editions of Research Beer held this semester featured an impressive lineup of keynote speakers, each sharing their expertise with an enthusiastic audience:

- **Prof. Raúl Benítez** (ANCORA) and **Prof. José María Cabrera** (PROCOMAME)
- **Prof. Elaine Armelin** (IMEM-BRT) and **Prof. Juan Velázquez** (GiES)
- **Prof. María José Jiménez** (MAPTHE) and **Prof. Herminio Martínez** (EPIC)

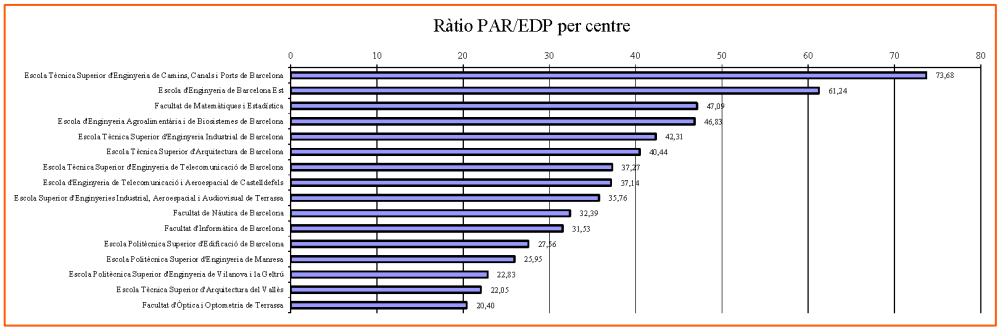
Each session blended science, innovation, just the right amount of casual conversation... and, of course, beer!

THE EEBE @ THE UPC RESEARCH RANKINGS

The 2021 research report endorsed by the Vice-Rectorate for Science Policy of the Universitat Politècnica de Catalunya (UPC),

https://drac.upc.edu/info%20/ca/lavaluaciodel-curriculum-vitae/upc-punts-par/informe/informe-any-2021

places the *Barcelona East School of Engineering* (**EEBE**) at the forefront of research among UPC's 16 schools and faculties, with a total of 11084.3 PAR. This marks a 12.8% increase in research productivity compared to 2020. In terms of normalized ratios, EEBE ranks second, achieving an impressive average of 61.24 research points per researcher (PAR/EDP).



Additionally, three other research groups based at (or represented within) EEBE (**CIEFMA-PROCOMAME**, **GEMMA**, and **SAC**) surpassed the 100 PAR/EDP mark in 2021, highlighting their significant research contributions.

Among the research groups based at EEBE, ENCORE (Energy Catalysis Process Reaction Engineering) leads the ranking with 219.52 PAR/EDP (and 78361.38 PATT/EDP, a metric reflecting normalized funding per researcher, including research grants, contracts, and patents).

AWARDS, GRANTS, & EVENTS

PhD Theses Defended

Nancy A. Ramirez (Advisor: Elisabet Roca/Joan de Pablo, CITES, R2EM), "Nature-based solutions for waterfronts reconfigurations: Litoral Besòs, analysis of an urban sustainability transition in the Barcelona metropolitan area" (Jul/2022)

Luis A. Chacón (Advisor: Cecilio Angulo/Pere Ponsa, GREC, SIC), "A socio-technical approach for assistants in human-robot collaboration in industry 4.0" (Jul/2022)

Sofia Valenti (Advisor: Jordi Puiggalí/Roberto Macovez, PSEP, GCM), "Physical properties, relaxation dynamics and applications of polymer solid dispersions" (Jul/2022)

Carlos Echevarría (Advisor: Jose Luis Cortina/Cesar Valderrama, R2EM), "Integration of advanced wastewater treatment and reclamation technologies for organic micropollutants removal and promote water reuse" (Jul/2022)

David Arcos (Advisor: Núria Ferrer/Lluís Ametller), "Caracterització optoelectrònica de materials bidimensionals a altes freqüencies" (Jul/2022)

Sajad Abdali (Advisor: Jordi de la Hoz/Jose Matas, SEPIC, EPIC), "Enhance of SOGI-FLL and SOGI-PLL response to voltage sags and swells perturbations" (Jul/2022)

Rafael Pacheco (Advisor: Julio Garcia/Daniel di Capua, (MC)2-UPC), "Constitutive model for fibre-reinforced composite materials exposed to high temperature" (Sep/2022)

Miguel Maso (Advisor: Ignasi de Pouplana/Eugenio Oñate, (MC)2-UPC), "Coupling shallow water models with three-dimensional models for the study of fluid-structure interaction problems using the particle finite element method" (Sep/2022)

Enrique Monso (Advisor: Angeles Carmona/Margarida Mitjana, MAPTHE), "Discrete operators and distances on subdivision networks" (Oct/2022)

Xènia García (Advisor: Jordi Llorca/Carlos Escudero, NEMEN), "In situ studies of catalytic processes by Near Ambient X-ray Photoelectron Spectroscopy" (Oct/2022)

Sergio Coronas (Advisor: Jordi de la Hoz/Helena Martin, SEPIC), "Aportació a l'anàlisi i gestió tècnica-econòmica dels sistemes de generació distribuïda amb energies renovables i microxarxes. Introducció a la presa de decisions en el context normatiu actual" (Oct/2022)

Débora C. Costa Da Silva (Advisor: Eric Duviella/Joaquim Blesa, SAC), "Leak Supervision in Water Distribution Networks based on model-based and data-driven approaches" (Nov/2022)

Ludmila Hodasova (Advisor: Elaine Armelin/Gemma Fargas, IMEM-BRT), "Polymer-zirconia based ceramic composites produced by 3D-printing" (Nov/2022)

Ana I. Macías (Advisor: Jessica Calvo/Jose M. Cabrera, PROCOMAME), "Afino microestructural de chapa de acero calidad DDQ mediante procesos de doblado - enderezado" (Nov/2022)

Lluís Oliver (Advisor; Carlos Mas, BBT), "Novel multifunctional biomimetic peptides for bone tissue engineering" (Nov/2022)

Harry Aguilar (Advisor: Rafael Pastor/Alberto Garcia Villoria, DOPS), "Equilibrado de líneas de montaje en paralelo con estaciones multilínea y dimensionado de buffers" (Nov/2022)

New Research Grants

Functional Nano-Scaffolds for Regenerative Medicine, HORIZON TMA MSCA Doctoral Networks, EC HORIZON 2020 #101072645 (2022-2026), UPC's PI: C. Alemán (IMEM-BRT)

Conductive and Interactive Multifunctional Hydrogel-Based Platforms for Biomedical Applications: Restoration of Cardiac, Skin and Nerve Tissues, MICINN, PID2021-125767OB-I00 (2022-2025), PI: C. Alemán/M. M. Pérez-Madrigal (IMEM-BRT)

Hidrogeles termosensibles para aplicaciones emergentes en ingeniería, MICINN, PID2021-125257OB-I00 (2022-2025), PI: E. Armelin /J. Torras (IMEM-BRT)

Transforming bone cancer therapy with composite biomateriales encapsulating plasma-generated RONS, European Research Council, PoC – ERC #101082096 (2022-2024), PI: C. Canal (BBT)

Bio-inspired AntiMicrobial Bone BIoceramics: Deciphering contact-based biocidal mechanisms, European Research Council, AdG – ERC #101055053 (2022-2027), PI: M.-P. Ginebra (BBT)

Valorization Support Studies for BIOMATDB Project, XarTec Salut, Call 2022 for Valorization Support Studies (2022), PI: M. Mateu (BBT)

Development of tailored 3D printed permanent and resorbable metallic scaffolds with biofunctionalized hydrogel for bone regeneration, MICINN, PID2021-125150OB-I00 (2022-2025), PI: J.M. Manero/D. Rodríguez (BBT)

Polymeric adaptable stents to treat pediatric aortic coarctation, MICINN, PID2021-124868OB-C22 (2022-2025), PI: M. Pegueroles (BBT)

Pròtesi de titani porós amb tractament de superfície dual osteoinductiu i antibacterià per a cirurgies d'osteotomia del peu, AGAUR, 2021 PROD 00073 (2022-2024), PI: D. Rodríguez (BBT)

Functionalized Inserts Reticular Bone, MICINN, PCI2021-122079-2B (2022-2025), PI: J.M. Manero (BBT)

Toward stronger 3D-printed calcium phosphate scaffolds for bone regeneration, MICINN, PDC2022-133143-I00 (2022-2024), PI: M.-P. Ginebra/C. Canal (BBT)

Process development and application of dual action smart coatings for use in evans-cotton wedges and dental implants, MICINN, PDC2022-133628-C21 (2022-2024), PI: J.M. Manero/M. Pegueroles (BBT)

Hidrogeles biomiméticos para liberar estrés oxidativo de plasmas fríos estimulan la regeneración de tejidos, MICINN, EUR2022-134060 (2022-2024), PI: C. Canal (BBT)

3D (bio)printing for integrating BIOMimetic Electronics into Engineered Tissues: A giant leap in regenerative medicine, MICINN, PLEC2022-009279 (2022-2025), PI: J.M. García Torres (BBT)

Cold plasma at atmospheric pressure: a physical therapy for the global management of pediatric bone cancer, MICINN, PLEC2022-009277 (2022-2025), PI: C. Canal (BBT)

Memories of the Nilotic landscape: survey,simulation and recreation of seasonal flooding in the Mimbal levee area (Minia, Egypt), MICINN, PID2021-128069NB-I00 (2022-2025), PI: J.I. Fiz Fernández/A. Guardo Zabaleta (CDIF)

Refrigerador barocalórico basado en caucho natural, MICINN, TED2021-129952B-C31 (2022-2024), PI: P. Lloveras (PTP-GlaDyM)

Caracterización teórica y experimental avanzada de materiales e intercaras de calcohaluros de baja dimensionalidad para su integración en células solares, MICINN, TED2021-130265B-C22 (2022-2024), PI: C. Cazorla (CCQM, PTP-GlaDyM)

Prediction of the distribution of turbulence-induced microplastic and organic matter aggregates in marine systems, MICINN, TED2021-132623A-I00 (2022-2024), PI: L. Jofre/F. Capuano (GReCEF)

Aeroacoustics of racing cars using high-fidelity computational models, Generalitat de Catalunya - Programa de Doctorats Industrials, DI-2022-040 (2022-2025), PI: F. Capuano/L. Jofre (GReCEF)

In silico simulation of the immune response of the glioblastoma-brain complex, MICINN, PID2021-126051OB-C44 (2022-2025), UPC's PI: J. Sarrate/N. Pares (LaCàN)

Sustainable production of bioproducts from cyanobacteria treating waste streams, MICINN, PID2021-126564OB-C32 (2022-2025), UPC's PI: I. Ferrer/J. Garcia (GEMMA)

Ultrasonic assisted ball burnishing tool for super finishing of pieces on the lathe, MICINN, PDC2022-133596-I00 (2022), PI: J.A. Travieso/R. Jerez (TECNOFAB)

Desarrollo y validación de estrategias de aprendizaje profundo y automático para el mantenimiento predictivo y detección temprana de daños estructurales en aerogeneradores, MICINN, PID2021-122132OB-C21 (2022-2026), UPC's PI: F. Pozo/Y. Vidal (CoDAlab)

Gemelos digitales para la monitorización de la condición de aerogeneradores, MICINN, TED2021-129512B-I00 (2022-2025), PI: F. Pozo/Y. Vidal (CoDAlab)

Experimental Assessment and Simulation of the Small-Scale Mechanical Behavior of Ceramic-base Composites, MICINN, PID2021-126614OB-I00 (2022-2025), PI: E. Jiménez (CIEFMA)/F. Canner

Herramienta de realidad virtual para el entrenamiento de la población y los servicios de emergencia en caso de incendio a partir de volúmenes 3D reales y simulaciones CFD, MICINN, TED2021-130484B-I00 (2022-2024), PI: E. Planas (CERTEC)/M. Pardàs

Awards

Brenda G. Molina García (IMEN-BRT) was awarded with the *UPC Outstanding Doctoral Dissertation* in 2022.

Nerea García de Albéniz (BBT) was awarded with the *FEMS Master Thesis Award* at Junior EUROMAT 2022, Coimbra (Portugal).

Marc Iglesias-Fernandez (BBT) was awarded with the *Best Oral Lecture* at Bioceramics 32: 32nd Symposium and Annual Meeting of ISCM 2022, Venice (Italy).

David Agis (CoDAlab) was awarded with the *EACS Early Career Award* 2022.

Prof. Luis Llanes (CIEFMA) received the *European Powder Metallurgy Association (EPMA) Fellowship Award 2022*, at the World PM Congress & Exhibition (Lyon, France, October 2022).

International Events, Meetings & Conferences at CDB

Workshop on Experimental Fire Monitoring, (September/2022; CERTEC)

CAMPUS DIAGONAL-BESOS
Research Newsletter

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