iBB

Institute for Bioengineering and Biosciences

Health-focused research translation

2026

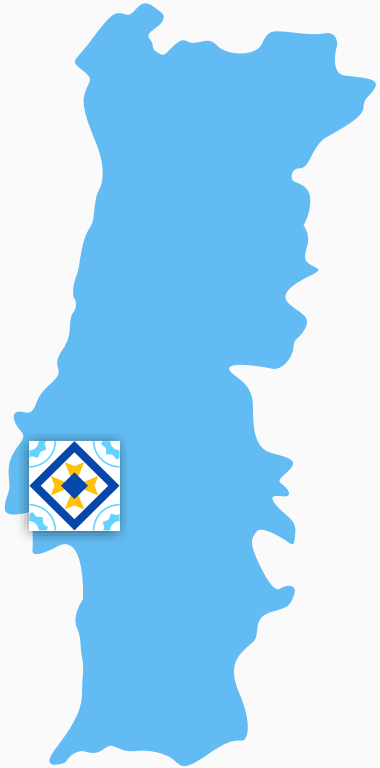
TÉCNICO LISBOA

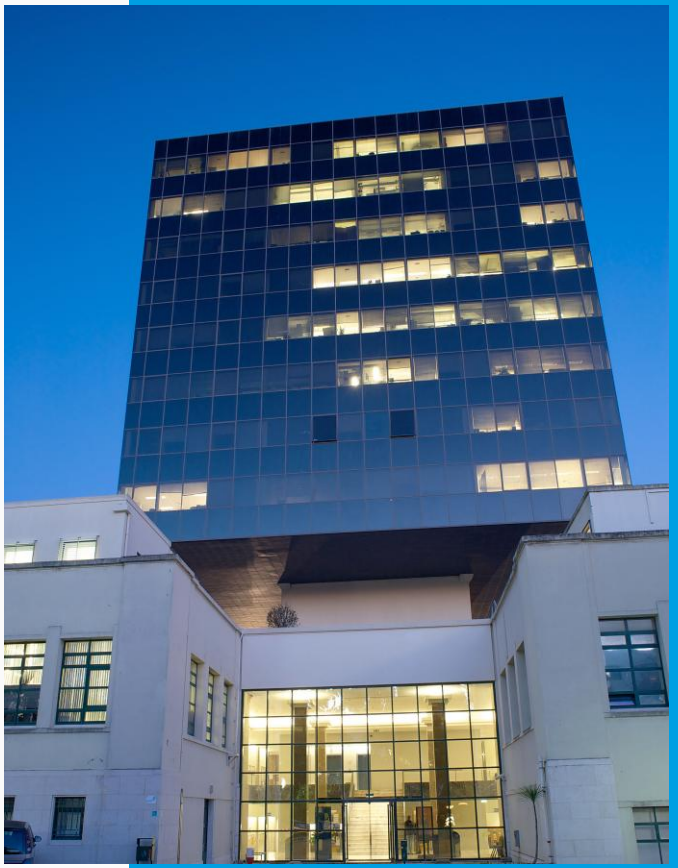
IST ID

What is iBB?

The Institute for Bioengineering and Biosciences (iBB) is an interdisciplinary research institute at the interface of life sciences and engineering, advancing health-focused research from human disease modelling to advanced therapeutic medicinal products (ATMPs) and regenerative medicine.

iBB integrates **biological sciences**, **engineering and bioprocess development** to support the **translation of research outcomes** into **clinically and industrially relevant health solutions.**





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Why iBB in health?

iBB addresses key bottlenecks in health research and translation by combining human-relevant biological models with engineering-driven development and scalable bioprocessing

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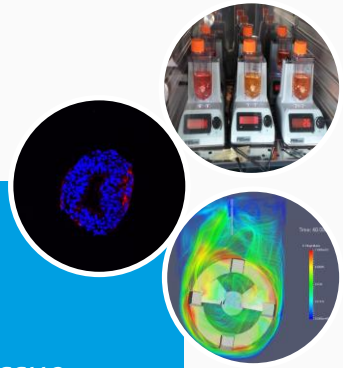
Stem cell Engineering Research Group



Cell Bioprocessing, Biomaterials and Tissue Engineering from cell reprogramming to biomanufacturing for Regenerative Medicine, Disease Modelling, Drug Testing and Cellular Agriculture.

Coordinator

Cláudia Lobato da Silva

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Biology and engineering of pluripotent stem cells

Using bioengineering tools to build **advanced hPSC-based models** of **neural, cardiac, and hepatic tissues** for **disease modelling, drug screening, and regenerative medicine;** creating disease-specific hiPSC lines, controls and engineered niches to guide differentiation and improve vascularization.

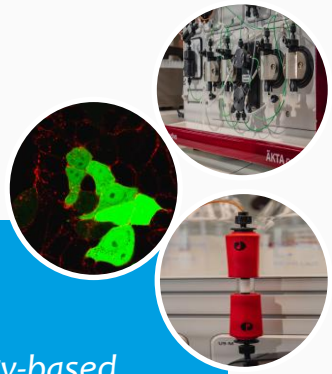
Development and manufacturing of cellular products

Scalable and controlled **manufacturing platforms for cell-based therapeutics** - including **HSPCs, MSCs**, **CAR-NK** cells, and their **Evs** - enhancing **expansion, functionality, and storage.**

Devices and Materials for sustainability and health

Advances health and food innovation through, **additive manufacturing** and **smart biomaterials** for **tissue regeneration** and **wireless therapies**; **scaffolds**, and devices, and sustainable **cellular agriculture;** AI-driven modelling to create **digital twins** of bioreactors.

Bioprocess Engineering Research Group



Exploring biology-based engineering solutions to optimize/streamline the manufacturing of biological molecules and formulations thereof for Health and Bioeconomy applications

Coordinator

Miguel Prazeres

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Microbial cell Factories

Harnessing the **biosynthetic** power of microorganisms to produce **nucleic acids, recombinant proteins,** and other high-value biomolecules, while also developing microbial factories for sustainable applications like **biorefineries** and **bio-cementation**.

Manufacturing of new Therapeutic Modalities

Improving **downstream processing** through the development of cost-effective methods for purifying **antibodies, proteins, nucleic acids,** and **bacteriophages**; optimizing the production of **mRNA, dsRNA, ssDNA,** and **protein nanocages.**

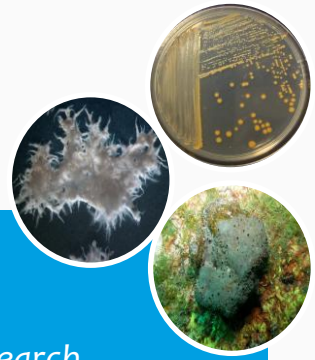
Future Biomanufacturing

Miniaturization, continuous biomanufacturing, and **digitalization** to define **optimal process conditions,** enhance efficiency, **reduce costs,** and ensure real-time **quality control** in the production of **ATMPs**.

Formulations for Delivery

Nanocarriers - **polymer** and **lipid-based** systems - for the **delivery** of drugs, biopharmaceuticals, and food ingredients; nanoparticle modification, **innovative polymers, formulation stability,** and lyophilization.

Biological Sciences Research Group



Advanced research methodologies, to uncover new insights and advance scientific understanding in Biological Sciences, directly impacting Health.

Coordinator

Arsénio Fialho

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Fungal Pathogenesis and Drug Resistance

Understanding **fungal infections** caused by **human pathogenic yeasts from a genome-wide perspective** and using this information to improve therapeutic options.

Bacterial Gene Expression and Pathogenesis

Studying key aspects of *Burkholderia cepacia* complex (Bcc) **pathogenesis**, including the **roles of sRNAs, surface adhesins, and multicellular aggregates** in infection, with a focus on **virulence, host interaction, and chronic adaptation**. Using molecular, biochemical, and in vivo approaches to explore targets for immune-based and anti-adhesion **therapies**, and to test biofilm-disrupting enzymes in the combat of Bcc infections and **anti-microbial resistance**.

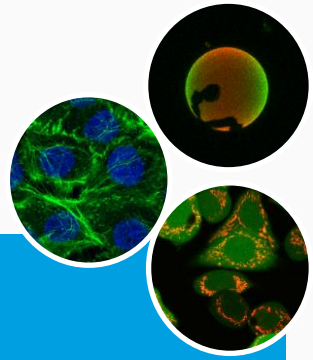
Tumour-targeting strategies for the development of selective therapies

Protein- and cell-based strategies to enhance **targeted cancer therapy**, focusing on nanoscale **drug delivery systems and theranostics** using 3D models to study peptide–cell interactions in the **tumour microenvironment**.

Multimodal approach for cell imaging and irradiation

New B/Fe/Au/nanodiamond **radiosensitizers** in 2D and emerging 3D cell models to investigate **cellular responses** - lipidomic, metabolomic, and genomic - after photon/proton irradiation, aiming to simulate metastasis and improve subcellular dose precision.

Biospectroscopy and Interfaces Research Group



“Electronic and vibrational spectroscopies, including fluorescence spectroscopy and microscopy (i), Molecular and Cellular Biophysics (ii), Biomaterials and Nanomedicine (iii).

Coordinator

Mário Berberan-Santos

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Characterization of lipid-protein and protein-protein interactions

Development of innovative **single-molecule approaches** for describing **Intrinsically disordered proteins** involved in **neurodegeneration**.

Study and development of novel cationic antimicrobial peptides

Development of **anti-biofilm drugs** such as **antimicrobial dendrimers**, **quorum-sensing inhibitors** (QSI) and efflux pump **inhibitors**.

Development of new bio and nanostructured materials

Engineering of **extracellular vesicle** (EV) - **mimic nanoparticles** obtained from plasma membrane ectosomes with the goal of accelerating the translation of **EV - inspired nanoparticle technologies**.

Synthesis/characterization of photosensitizers, fluorescent probes and OLEDs

Development of **new scintillator materials**, and their application in **detectors** including **medical devices** (e.g. X-ray and gamma detectors).

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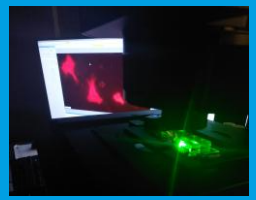





Scientific Field	Technology
Biomanufacturing	• BSL1 facilities • Cryogenic storage facilities • Refrigerated ultracentrifuges (batches up to 2L) • Controlled bioreactors (from 1L to 5L) • 3D printers • Chromatography (analytical and preparative) • Membrane filtration (lab-scale and access to 30-50L pilot-scale) • Solid-phase and Liquid-phase extraction systems • GC-FID • GC-MS
Genomics	• Thermocyclers (qPCR and RT-PCR) • ELISA • CRISPR dedicated facilities • QuBit fluorometer + Nanodrop • Nanopore
Cellular analysis	• Flow cytometry • Microelectrode array • Patch clamp • Immunostaining • Dedicated BSL2 facility for Sendai virus iPSC reprogramming
Imaging	• Fluorescence, confocal microscopy • FRET, FLIM, FRAP • ATR-FTIR • Circular dichroism • FCS measurements. • Lifetime measurements and multi-photon excitation imaging • SPR
Synthesis/characterisation	• Sonication probe • Zetasizer • Drug release test • Freeze dryer, Freeze-drying microscopy • X-Ray powder diffraction and X-Ray microtomography • SEM

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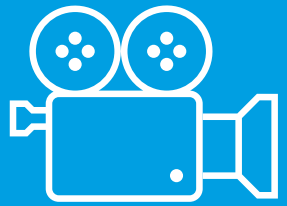
Thank you!



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