School of Industrial Engineering (EII), University of Extremadura. Spain.

PROMOTIONAL PROFILE

RESEARCH GROUP:

INGEBIO3D

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School of Industrial Engineering (EII) (Spain)

The School of Industrial Engineering (EII) of the University of Extremadura offers a highly interdisciplinary research ecosystem, integrating expertise across materials science, industrial engineering, automation, electronics, digital manufacturing and sustainability. A diverse portfolio of research groups with complementary profiles enables effective cross-disciplinary collaboration and integrated approaches to complex technological challenges.

The School's modern facilities, shared laboratories and collaborative spaces, including a FabLab, support joint experimentation, prototyping and process development. Combined with strong experience in national and European collaborative projects and active participation in international research networks, EII provides an ideal environment for multidisciplinary research in advanced biomanufacturing and bio-based industrial technologies.

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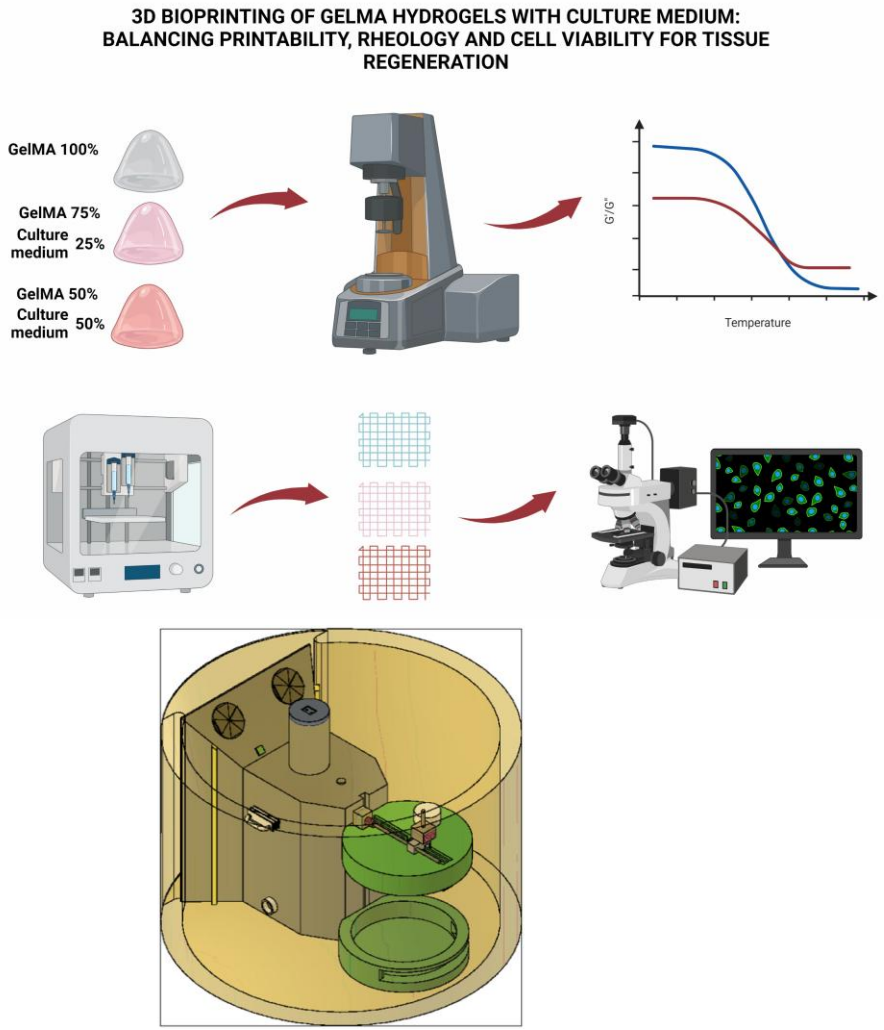
INGEBIO3D

- INGEBIO3D is an interdisciplinary research group integrating Materials Engineering, Biology and 3D Printing technologies.
- Our main research lines include 3D bioprinting of tissues and bioengineered constructs, design, fabrication and prototyping of biosensors and smart sensing systems, and the design, processing and physicochemical, mechanical and biological characterization of biomaterials.
- The group also develops advanced bio-based hydrogels, structure-function relationships in printed architectures, micro- and macro-porosity control, and integration of living systems with functional materials.
- Through a strong interdisciplinary approach, INGEBIO3D addresses challenges at the interface of biomanufacturing, smart materials, sensing technologies and bio-inspired engineering, with a clear focus on applied research, prototyping and technology transfer.



Test device for the optimisation of 3D bioprinting registered under patent number U202300008.

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Partners search

Projects Idea

Idea 1 — Smart Bioactive Wound Dressings with Integrated Biosensing and On-Demand Drug Release

Development of next-generation bio-based wound dressings integrating 3D-bioprinted hydrogel architectures, embedded biosensors and controlled drug delivery systems to enable real-time monitoring and adaptive therapeutic response during wound healing.

- Design of bio-based, printable hydrogels (e.g. polysaccharide- and protein-derived) with tailored porosity and degradation profiles.
- Integration of miniaturised biosensors (pH, temperature, inflammatory markers, bacterial metabolites) within the dressing.
- Development of stimuli-responsive drug release mechanisms (pH, enzymatic activity, electrical or thermal triggers).
- Use of 3D bioprinting to control spatial distribution of sensing elements and drug reservoirs.

Idea 2 — Bioengineered 3D-Printed Living Constructs for Advanced In Vitro Models and Biosensing Platforms

Development of 3D-bioprinted living constructs based on cell aggregates embedded in functional hydrogels, designed as advanced in vitro models and biohybrid sensing platforms for testing, screening and bioprocess optimisation.

- Controlled generation and integration of cell aggregates with defined size and metabolic activity.
- Design of hierarchically porous hydrogels to optimise nutrient diffusion and long-term viability.
- Incorporation of embedded sensing elements to monitor metabolic activity, oxygen consumption or biomarker release.
- Application of biofabrication strategies to create reproducible, scalable constructs.

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[End users]

Potential end users include:

- **Companies in biomanufacturing and bio-based materials**, interested in advanced hydrogels, structured bio-based materials and scalable manufacturing processes.
- **Manufacturers of biosensors and smart sensing devices**, benefiting from biofunctional materials, printed architectures and integrated sensing platforms.
- **Industrial partners in advanced manufacturing and Industry 4.0**, applying 3D printing and digital fabrication technologies for prototyping and process optimisation.
- **Healthcare and biomedical technology companies**, particularly those developing tissue-engineered products, in vitro models or diagnostic platforms.
- **Research and technology organisations (RTOs) and pilot-scale facilities**, supporting validation, upscaling and pre-industrial testing of developed solutions.

[Networks & Main Partners]

- **Center for Minimally Invasive Surgery (CCMI)**: validation of advanced applications in **preclinical and large-animal models**.
- **FUNDESALUD and the Health Cluster of Extremadura**: **dissemination and stakeholder engagement** activities.
- **FUNDECYT – Science and Technology Park of Extremadura**: linkage with the **regional industrial ecosystem** and technology transfer.
- **Advanced laboratories at the University of Extremadura and partner institutions in Spain and Portugal**: **interdisciplinary and cross-border research collaboration**.

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Thank you

FOR YOUR ATTENTION

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