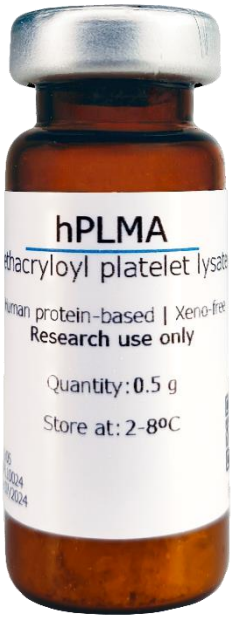
Product Data Sheet

hPLMA - PHOTOPOLYMERIZABLE HYDROGEL

hPLMA* PHOTOPOLYMERIZABLE HYDROGEL is a xeno-free, animal serum-free, bioactive platelet lysates-based platform that provides physiologically relevant microenvironments for cells cultured *in vitro*. The precursor solution is easily prepared by reconstituting hPLMA lyophilizate in an aqueous solution with a photoinitiator. Afterwards, it can be cured upon light exposure to form a hydrogel with tuneable mechanical properties. hPLMA Photopolymerizable Hydrogels provide great control over gelation time and matrix stiffness, enabling researchers to create the cell culture environment that better fits their needs.



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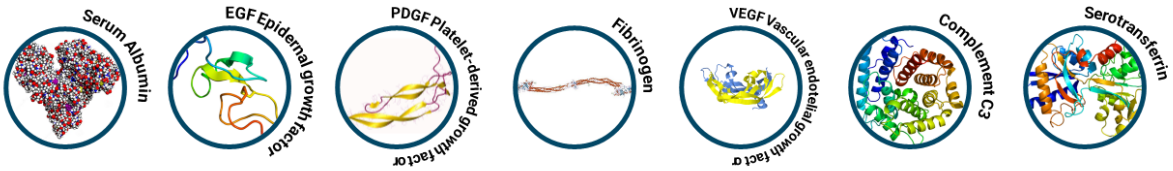
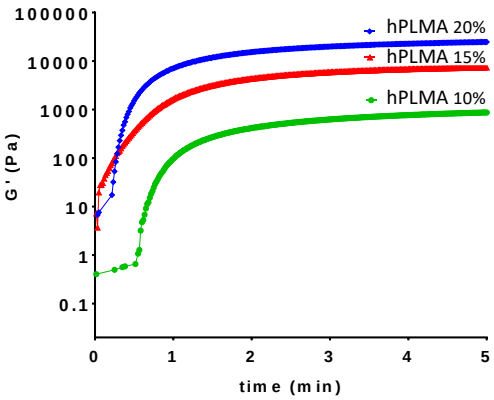
hPLMA - PHOTOPOLYMERIZABLE HYDROGEL is composed of several proteins, including growth factors and cytokines. These bioactive proteins are known to be key components involved in cell adhesion and proliferation processes.

MAIN COMPONENTS



hPLMA - PHOTOPOLYMERIZABLE HYDROGEL has tunable mechanical properties adjusted by the concentration of hPLMA lyophilizate in the precursor solution. It is therefore possible to obtain hydrogels with different stiffnesses this way closely mimicking the mechanical properties of native tissues.



hPLMA - validation in cell culture

CELL VIABILITY AND PROLIFERATION:

Encapsulated stem cells maintain their viability for at least 7 days and are able to proliferate inside the hydrogels.

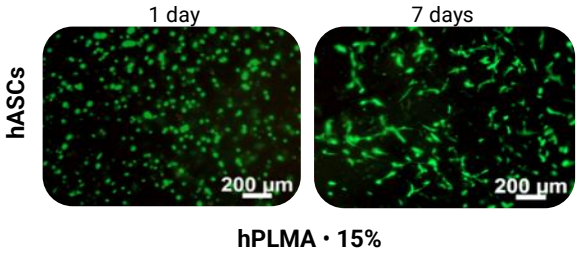


Figure 1 - Representative fluorescence images for hASCs encapsulated in hPLMA 15% w/v live/dead[1].

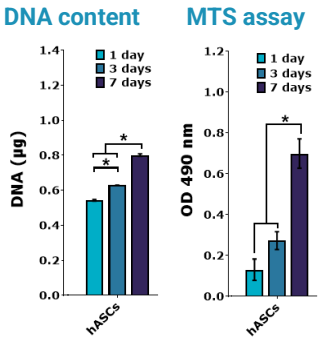


Figure 2 - DNA and MTS results for hASCs at 1, 3, and 7 days encapsulated cell culture [1].

CELL INVASION AND PROLIFERATION

hPLMA hydrogels support the tumour invasion behaviour of cancer cell lines (MG-63, SaOS-2, and A549) and hBM-MSC spheroids. Different cell lines present different invasiveness ability, reflected in hPLMA hydrogels and present a better performance than the animal-derived platform counterpart.

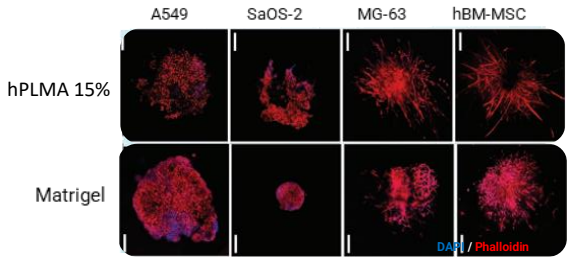


Figure 3 - Representative fluorescence images for A549, SaOS-2, MG-63 and hBM-MSC encapsulated in hPLMA 15% w/v and Matrigel labelled with Dapi/phalloidin[2].

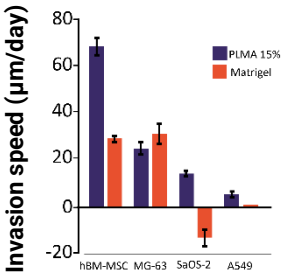


Figure 4 - Invasion speed results for A549, SaOS-2, MG-63 and hBM-MSC encapsulated in hPLMA 15% w/v and Matrigel.

Dynamic conditions enabled growth and invasiveness ability of hPLMA Hydrogels by metastatic cancer cells.

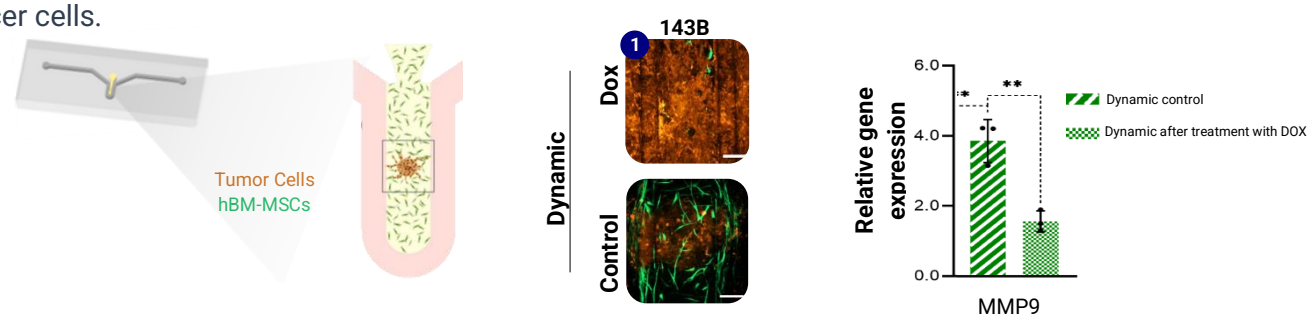


Figure 5 - Metastatic Cancer Cells Thrive amidst Dynamic Conditions within hPLMA Hydrogels[4].

hPLMA as a Bioink

3D BIOPRINTING BY EXTRUSION

The 3D bioprinted constructs with hPLMA, Laminaran-methacrylate (LamMA), Glucoamylase, and hASC, cultured in glucose-free medium, exhibited high cell viability and cell elongated morphology, highlighting the potential of hPLMA as a glucose self-supplying bioink.

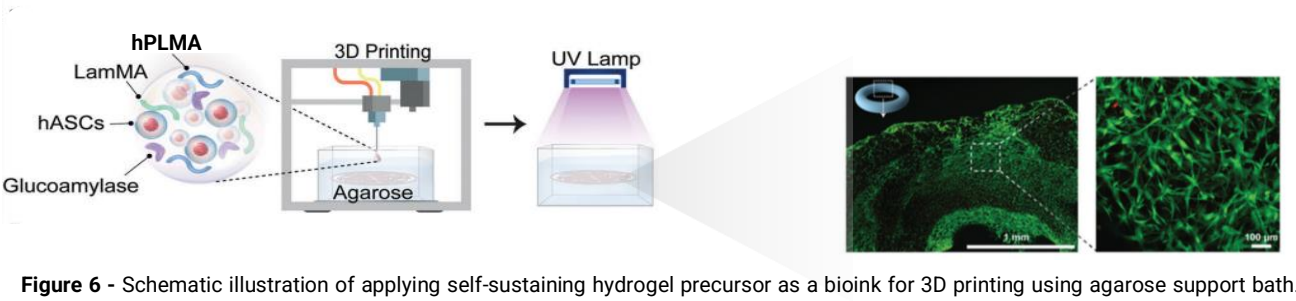


Figure 6 - Schematic illustration of applying self-sustaining hydrogel precursor as a bioink for 3D printing using agarose support bath. Representative confocal images of live-dead assay of 3D printed ring structure (Rectilinear pattern, 80% infill) after 7 days of culture in DMEM no glucose [5].

Validated Human Cells

These are some of the human cells already validated with our hPLMA product.

References:

1. Santos, S. C., Custódio, C. A., Mano, J. F., *Photopolymerizable Platelet Lysate Hydrogels for Customizable 3D Cell Culture Platforms*. Adv. Healthcare Mater. 2018, 7, 1800849. https://doi.org/10.1002/adhm.201800849
2. Monteiro, C. F., Santos, S. C., Custódio, C. A., Mano, J. F., Human Platelet Lysates-Based Hydrogels: A Novel Personalized 3D Platform for Spheroid Invasion Assessment. Adv. Science. 2020, 7, 1902398. https://doi.org/10.1002/advs.201902398
3. Monteiro, C. F., Custódio, C. A., Mano, J. F., *Bioengineering a humanized 3D tri-culture osteosarcoma model to assess tumor invasiveness and therapy response*. Acta Biomaterialia. 2021, 134. https://doi.org/10.1016/j.actbio.2021.07.034
4. Santos, S. C., Custódio, C. A., Mano, J. F., *Human Protein-Based Porous Scaffolds as Platforms for Xeno-Free 3D Cell Culture*. Adv. Healthcare Mater. 2022, 2102383. https://doi.org/10.1002/adhm.202102383
5. Mehrzad Zargarzadeh, Maria C Gomes, Sónia G. Patrício, Catarina A. Custódio and João F. Mano *A Self-Sustaining Hydrogels with Autonomous Supply of Nutrients and Bioactive Domains for 3D Cell Culture.* Advanced Functional Materials. 2023, 33, 2214372. https://doi.org/10.1002/adfm.202214372

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