# HYDROBIO INX© U200

"Highest resolution ever achieved in the presence of cells!"

The HYDROBIO INX© product family consists of gelatin-based hydrogel products which provide all the biological benefits of gelatin or gel-MA, in combination with high resolution processability enhanced by a high reactivity and fast curing speed. Therefore, structuring can occur at relatively low laser powers and high scanning speeds. As a consequence, it is the ideal material to transfer previous low resolution gel-MA related successes towards high-resolution applications.


HYDROBIO INX© U200 is based on gelatin type B derived from natural collagen which is modified with photo-crosslinkable functional groups enabling efficient multiphoton processing at 780 nm in the presence of the supplied crosslinker.

After processing, it mimics the natural extracellular matrix because it is derived from natural collagen. Additionally, as the formed hydrogel is biodegradable, it allows cells to remodel the environment and substitute it with newly formed extracellular matrix over time.

## BIOLOGICAL APPLICATIONS & PUBLICATIONS

HYDROBIO INX© U200 is gelatin-based, making it is suitable for a very wide range of biological applications. It allows for cell encapsulation during printing, making it the only commercially available high resolution bioink (resolution down to 1 µm).

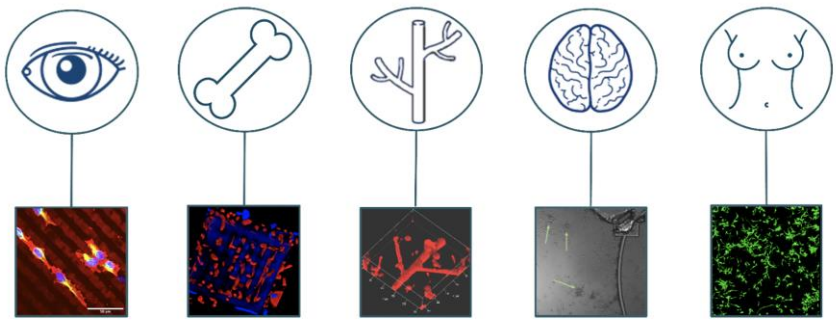

Figure 1: Examples of biological applications.

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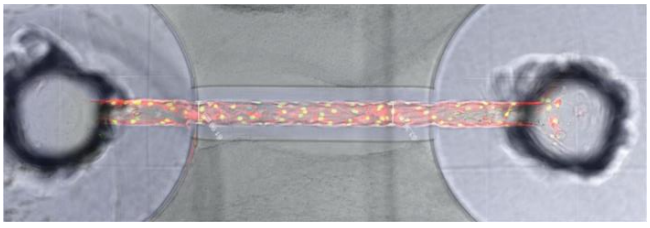
Examples of the biological performance of the HYDROBIO INX© product family include (Figure 1):

- ✓ Culturing and guiding corneal endothelial cells for ocular applications. These cells are notorious for their difficult handling in cell culture, but nevertheless they adhere and proliferate easily on 3D printed patterns using the HYDROBIO INX© U200 formulation
- ✓ Encapsulation of osteoblasts in the X HYDROBIO INX© U200 formulation
- ✓ Formation of an endothelial cell lined microvascular channel by HUVECs using HYDROBIO INX© U200
- ✓ Encapsulation of pericytes in HYDROBIO INX© U200 for a blood-brain model
- ✓ Encapsulation of adipose tissue derived stem cells in HYDROBIO INX© U200

## BLOOD VESSEL ON CHIP

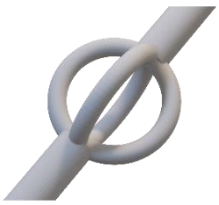


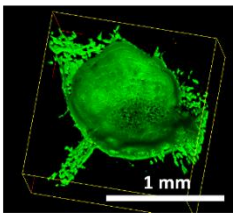
HYDROBIO INX© U200 was used for the generation of a cardiovascular model on a microfluidic chip. In this respect, a perfusable channel was printed, followed by subsequent seeding of HUVECs to line the channel, followed by encapsulating the channel into a fibrin hydrogel containing fibroblasts. (Image Courtesy of F. Cantoni).

Read more here: https://onlinelibrary.wiley.com/doi/full/10.1002/admt.202300718

## CARDIOVASCULAR MODEL ON CHIP

ASTROCARDIA






In the ASTROCARDIA project, effects of ageing are tested on cardiac spheroids by sending them to the International Space Station, since cardiac cells age up to 20 times faster in space in comparison to earth. To this end, the cardiac spheroids are printed directly inside the microfluidic chip using 2PP printing. To this end, HYDROBIO INX© U200 is used for the printing of a microvascular network (with vascular diameters down to 50 µm) around the cardiac spheroid. The printed spheroids exhibited beating and high cell viability up to 6 weeks after printing.

Read more here: https://astrocardia.com/

## PROPERTIES & PROCESSING

HYDROBIO INX© U200 is offered as a 3-component system. It contains a yellow gel, a crosslinker and a buffer. After heating, the yellow gel becomes liquid and can be diluted with the buffer, which can be substituted by a cell suspension enabling cell encapsulation. After combining with the crosslinker, the material can be processed and will turn into a physical gel upon cooling, thereby providing support to free standing structures during printing.

| Physical Properties | HYDROBIO INX© U200 |
|---|---|
| Appearance | Yellow gel |
| Storage Modulus (kPa) | 3 - 18 |
| Post processing linear swelling (%) | 15 - 50 |
| Post processing total volume increase (%) | 50 - 250 |

HYDROBIO INX© U200 resins are characterized by fast curing kinetics, after which the material becomes physiologically stable (Figure 2). However, despite being physiologically stable, the material can still be degraded enzymatically by cells. After curing, the resin is characterised by a storage modulus in the range of 3 - 18 kPa, making it suitable for a range of soft tissue applications. After processing, the material takes up a limited amount of medium, resulting in a small increase in dimensions after printing, typically ranging around a 15 - 25 % linear increase.

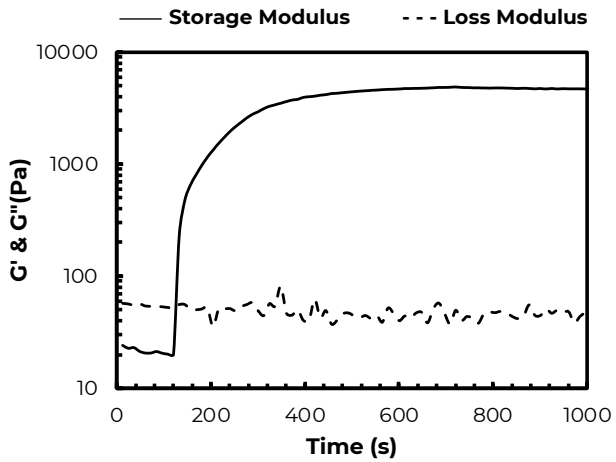



Figure 2: Storage and loss moduli of HYDROBIO INX© U200 during UV crosslinking.

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## BENEFITS OF HYDROBIO INX© U200

- ✓ Biocompatibility: Supports cell adhesion and proliferation, and allows for encapsulation
- ✓ Reproducibility: Production under strict quality control
- ✓ Biodegradability: Enables cellular remodelling of the printed matrix
- ✓ Easy handling: Delivered in a ready-to-use kit containing a concentrated stock solution, dilution buffer and crosslinker for 10 prints in the presence or absence of cells. Ready for printing in 10 min
- ✓ Stable for at least 3 months at 4 - 8°C

| | Organic-Inorganic Hybrids | Conventional gel-MA based inks | HYDROBIO INX© U200 |
|---|---|---|---|
| High resolution | ✓ | ✗ | ✓ |
| Cell-encapsulation | ✗ | ✓ | ✓ |
| Biodegradability | ✗ | ✓ | ✓ |
| Biocompatibility | ✗ | ✓ | ✓ |
| Hydrogel | ✗ | ✓ | ✓ |
| High reactivity | ✓ | ✗ | ✓ |

## 3D PRINTER COMPATIBILITY

Our multiphoton lithography bioinks can be used with a range of multiphoton lithography systems. HYDROBIO INX© U200 is sold exclusively via Upnano and has already been validated on the following multiphoton lithography systems:

- ✓ NanoOne
- ✓ NanoOne Bio

If you would like to discuss your printer's compatibility with our resins, please contact us at info@bioinx.com